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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Crops Research Division

AN EVALUATION OF SEVERAL CHEMICALS FOR THEIR HERBICIDAL PROPERTIES
1959 Field Results

W. A. Gentner, L. L. Danielson and W. C. Shaw

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FEB 20 1964

Plant Industry Station
Beltsville, Maryland
January 1960

CURRENT SERIAL RECORDS

Preliminary Data Not For Publication

This is a progress report of cooperative investigations containing data the interpretation of which may be modified with additional experimentation. Therefore, publication, display, or distribution of any data or any statements herein should not be made without prior written approval of the Crops Research Division, Agricultural Research Service, United States Department of Agriculture, and the cooperating agency or agencies concerned.

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Source and Index of Chemicals Included in This Report

Chemical	Designation *	Carrier	Source **	Table numbers ***
2,4-dichlorophenoxyacetic acid, alkanolamine salt	2,4-D	Water	DCC <u>5/</u>	1, 16, 23
2-(2,4,5-trichlorophenoxy)propionic acid, alkanolamine salt	silvex	Water	DCC	1, 16, 23
4,6-dinitro-o-sec butylphenol, alkanolamine salt	DNEP	Water	DCC	1, 16, 23
Q-2,4-dichlorophenyl O-methyl isopropylphosphoramidothioate	-	Water	DCC	1, 16, 23
3,4-dichloropropionanilide	-	Water	RHC <u>14/</u>	2, 16, 23
ethyl-o-nitrophenylsulfide	-	Water	MCC <u>11/</u>	2, 16, 23
2,3,5,6-tetrachloroterephthalic acid, dimethyl ester	-	Water	DAC <u>4/</u>	2, 16, 23
isopropyl N-(3-chlorophenyl)carbamate	CIPC	Water	CSC <u>3/</u>	2, 16, 23
4-chloro-2-butynyl N-(3-chlorophenyl)carbamate [barbane]	-	Water	SCC <u>15/</u>	3, 16, 23
ethyl N,N-di-n-propylthiolcarbamate	EPTC	Water	STF <u>16/</u>	3, 17, 23
ethyl ethyl-n-butylthiolcarbamate	-	Water	STF	3, 17, 23
n-propyl-di-n-propylthiolcarbamate	-	Water	STF	3, 17, 23
propyl ethyl-n-butylthiolcarbamate	-	Water	STF	4, 17, 23
N-(3,4-dichlorophenyl)methylacrylamide	-	Water	NFM <u>13/</u>	4, 17, 23
N-(3,4-dichlorophenyl)-2-methylpentanamide	-	Water	NFM	4, 17, 23
N-(3-chloro-4-methylphenyl)-2-methylpentanamide	-	Water	NFM	4, 17, 23
3-(3,4-dichlorophenyl)-1,1-dimethylurea	diuron	Water	EID <u>6/</u>	5, 17, 23
1-chloro-N-(3,4-dichlorophenyl)-N,N-dimethylformamide	-	Fuel oil	EID	5, 17, 23
fuel oil (6.6 gal/h)	-	-	-	24
3-(3,4-dichlorophenyl)-1-isopropyl-1-(2-propynyl)urea	-	Water	MCC	5, 18, 24
2,3,6-trichlorobenzoic acid, sodium salt	2,3,6-TBA	Water	EID	5, 18, 24
2-methyl-3,6-dichlorobenzoic acid, dimethylamine salt	-	Water	HCC <u>9/</u>	6, 18, 24
2-methoxy-3,6-dichlorobenzoic acid, sodium salt	-	Water	VEL <u>8/</u>	6, 18, 24
2-methoxy-3,6-dichlorobenzoic acid, monoethanolamine salt	-	Water	VEL	24
2-methoxy-2,6-dichlorobenzoic acid, diethanolamine salt	-	Water	VEL	24
2-methoxy-3,6-dichlorobenzoic acid, triethylamine salt	-	Water	VEL	24
2-methoxy-3,6-dichlorobenzoic acid, dimethylamine salt	-	Water	VEL	24
2-methoxy-3-chloro-6-methylbenzoic acid	-	Acetone	VEL	6, 18, 24
2,6-dimethoxy-3-chlorobenzoic acid	-	Acetone	VEL	6, 18, 24

Chemical	Designation *	Carrier	Source **	Table numbers ***
2-methoxy-3-methyl-5-chlorobenzoic acid	-	Acetone	VEL	7, 18, 24
2-methoxy-3-nitro-5-chlorobenzoic acid	-	Acetone	VEL	7, 18, 24
2,5-dichloro-3-bromobenzoic acid	-	Acetone	KCC <u>10/</u>	7, 18, 24
2-methoxy-3,5-dichlorobenzoic acid, monoethanolamine salt	-	Water	VEL	24
2-methoxy-3,5-dichlorobenzoic acid, dimethylamine salt	-	Water	VEL	24
2-methoxy-3,5-dibromobenzoic acid	-	Acetone	VEL	7, 19, 24
2-methoxy-3,5-dinitrobenzoic acid	-	Acetone	VEL	8, 19, 24
3-amino-2,5-dichlorobenzoic acid, triethylamine salt	amiben	Water	ACP <u>1/</u>	8, 19, 25
2-methoxy-3,5,6-trichlorobenzoic acid, monoethanolamine salt	-	Water	VEL	25
2-methoxy-3,5,6-trichlorobenzoic acid, dimethylamine salt	-	Water	VEL	25
2-methoxy-3,5-dichloro-6-bromobenzoic acid	-	Acetone	VEL	8, 19, 25
2-methoxy-3,5-dichloro-6-nitrobenzoic acid	-	Acetone	VEL	8, 19, 25
2-methoxy-3,6-dichloro-5-nitrobenzoic acid	-	Acetone	VEL	9, 19, 25
2,6-dimethoxy-3,5-dichlorobenzoic acid	-	Acetone	VEL	9, 19, 25
5-nitro-2,3,6-trichlorobenzoic acid, dimethylamine salt	-	Water	HCC	9, 19, 25
polychlorobenzoic acid (chlorination of benzoyl chloride)	PBA	Acetone	KCC	25
polychlorobenzoic acid (direct chlorination of benzoic acid)	PBA	Acetone	KCC	25
n-butyl-2-propoxybenzoate	-	Water	UPJ <u>17/</u>	25
2,3,6-trichlorophenylacetic acid, sodium salt	fenac	Water	ACP	9, 19
2,3,6-trichlorophenylacetamide	-	Water	ACP	25
2-methoxy-3,5-dichlorophenylacetic acid	-	Acetone	VEL	25
2-methoxy-3-chlorophenylacetic acid, sodium salt	-	Water	MDU <u>12/</u>	25
2-methoxy-3,4-dichlorophenylacetic acid, sodium salt	-	Water	MDU	25
2-methoxy-3,6-dichlorophenylacetic acid	-	Acetone	VEL	10, 20, 25
2-chloro-4,6-bis(ethylamino)-s-triazine (50% WP)	simazine	Water	GCC <u>8/</u>	10, 20, 25
2-chloro-4,6-bis(ethylamino)-s-triazine (80% WP)	simazine	Water	GCC	26
2-allylamino-4-chloro-6-isopropylamino-s-triazine	-	Water	GCC	10, 20, 26
2-chloro-4-ethylamino-6-diethylamino-s-triazine	trietazine	Water	GCC	10, 20, 26
2-chloro-4-ethylamino-6-(3-methoxypropylamino)-s-triazine	-	Water	GCC	11, 20, 26
2-chloro-4-isopropylamino-6-(3-methoxypropylamino)-s-triazine	-	Water	GCC	11, 20, 26
2-diethylamino-4-N-isopropylacetamido-6-methoxy-s-triazine	-	Water	GCC	11, 20, 26

Chemical	Designation *	Carrier	Source **	Table numbers ***
2-N-ethylacetamido-4-N-isopropylacetamido-6-methoxy-s-triazine	-	Water	GCC	11, 20, 26
2,4-bis(N-ethylacetamido)-6-methoxy-s-triazine	-	Water	GCC	12, 20, 26
2-ethylamino-4,6-bis(isopropylamino)-s-triazine	-	Water	GCC	12, 21, 26
2,4-bis(ethylamino)-6-isopropylamino-s-triazine	-	Water	GCC	12, 21, 26
2-ethylamino-4-isopropylamino-6-methylamino-s-triazine	-	Water	GCC	12, 21, 26
2-ethylamino-4-isopropylamino-6-methylmercapto-s-triazine	-	Water	GCC	13, 21, 26
2,4-bis(ethylamino)-6-methylmercapto-s-triazine	-	Water	GCC	13, 21, 26
2,4-bis(N-ethylbenzamido)-6-methoxy-s-triazine	-	Water	GCC	13, 21, 26
2,4-bis(ethylamino)-6-trichloromethyl-s-triazine	-	Water	GCC	13, 21, 26
2-ethoxy-4,6-bis(N-isopropylacetamido)-s-triazine	-	Water	GCC	14, 21, 26
2-isopropylamino-4-methylamino-6-methylmercapto-s-triazine	-	Water	GCC	14, 21, 26
2,4-bis(isopropylamino)-6-methylmercapto-s-triazine	-	Water	GCC	14, 22, 26
2-methoxy-4-diethylamino-6-isopropylamino-s-triazine	-	Water	GCC	14, 22, 27
2-methoxy-4,6-bis(ethylamino)-s-triazine	simetone	Water	GCC	15, 22, 27
2-methoxy-4,6-bis(3-methoxypropylamino)-s-triazine	-	Water	GCC	15, 22, 27
3-amino-1,2,4-triazole-ammonium thiocyanate	amitrol-T	Water	ACP	27
potassium fluoborate	-	Water	FOI 2/	27
dimethylarsinic acid	-	Water	ASC 2/	27

* Designation refers to the acid equivalent where applicable, and when not applicable to the active ingredient.

** Source

Abbr.	Source of Chemicals	Contact	Abbr.	Source of Chemicals	Contact
1/ ACP	Amchem Products, Inc., Ambler, Pennsylvania	R. H. Beatty	10/ KCC	Kolker Chemical Corp., Newark, N. J.	J. G. Brunton
2/ ASC	Ansul Chemical Co., Marinette, Wisconsin	M. L. Neville	11/ MCC	Monsanto Chemical Co., St. Louis, Mo.	L. H. Hannah
3/ CSC	Columbia Southern Chemical Corp., Pittsburgh, Pa.	E. D. Witman	12/ MDU	Maryland University, College Park, Md.	E. W. Reeve
4/ DAC	Diamond Alkali Corp., Cleveland, Ohio	L. G. Utter	13/ NFM	Niagara Chemical Div., Food Machinery & Chemical Corp., Middleport, N. Y.	E. S. Hagood
5/ DCC	Dow Chemical Co., Midland, Michigan	L. Southwick	14/ RHC	Rohm & Haas, Philadelphia, Pa.	D. W. Young
6/ EID	E. I. duPont de Nemours & Co., Wilmington, Del.	J. E. Johnson	15/ SCC	Spencer Chemical Co., Kansas City, Mo.	H. C. Zeisig
7/ FOI	Fine Organics, Inc., Lodi, New Jersey	R. Varner	16/ STF	Stauffer Chemical Co., Mountain View, Cal.	J. Antognini
8/ GCC	Geigy Chemical Corp., Yonkers, New York	T. E. Molnar	17/ UPJ	Upjohn Company, Kalamazoo, Michigan	G. Swank, Jr.
9/ HCC	Heyden Newport Chemical Corp., Garfield, N. J.	C. E. Bartley	18/ VEL	Veliscol Chemical Corp., Chicago, Ill.	L. L. Stitt
		R. H. Barth			

*** Table numbers - Pre-planting, 1-15; Pre-emergence, 16-22; Post-emergence, 23-27.

AN EVALUATION OF SEVERAL CHEMICALS FOR THEIR HERBICIDAL PROPERTIES

1959 Field Results

W. A. Gentner, L. L. Danielson and W. C. Shaw ^{1/}

The purpose of this report is to present the 1959 results of the preliminary field evaluation studies of several chemicals for their herbicidal properties. These studies were conducted by personnel of the Weed Control in Crops Section, Crops Protection Research Branch, Crops Research Division, at the Plant Industry Station, Beltsville, Maryland.

The objectives of the herbicide evaluation project are (1) to develop herbicide evaluation techniques, (2) to determine the responses of crops and weeds to new chemicals applied as soil-incorporated pre-planting, pre-emergence and post-emergence treatments, (3) to obtain preliminary information on the herbicidal properties of new chemicals, (4) to study the relationships between chemical structure and herbicidal activity, and (5) to make this information available to Department of Agriculture personnel and cooperating state and chemical industry weed research workers.

These field evaluation studies should be interpreted as preliminary and the results analyzed and used accordingly.

MATERIALS AND METHODS

Three areas have been selected at the Plant Industry Station for field evaluation of chemicals for their herbicidal properties. A three year rotation has been established to insure uniform weed populations and to reduce the possibility of confounding results due to chemicals which vary in effectiveness in controlling weeds and residual activity in the soil. During the years when an area is not directly utilized for herbicide evaluation it is planted to corn in the summer and a cover crop mixture of rye and vetch during the fall-spring period.

Primary Field Evaluation Studies

Twenty-four crop and seven weed species were seeded May 20, 1959 on a well fertilized field-area consisting of a mixture of Codorus and Kalmia silt loams and Cliffwood sandy loam at Beltsville, Maryland. Each large-seeded crop, with the exception of gladiolus and walnuts, was seeded with a calibrated tractor-powered seeder at the recommended rate and depth of seeding in four rows spaced 20 inches apart. Gladiolus and walnuts were hand-planted four inches deep. The term broadleaved weeds in tables 1-27 refers collectively to

^{1/} Plant Physiologists, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland.

ragweed (Ambrosia artemisiifolia), smartweed (Polygonum pennsylvanicum), carpet-weed (Mollugo verticillata), morning glory (Ipomoea purpurea), dogbane (Apocynum cannabinum) and horsenettle (Solanum carolinense) which infested the experimental area. The term grasses in these tables refers to various fox-tail species (Setaria spp.), barnyard grass (Echinochloa crusgalli) and goosegrass (Eleusine indica).

Several weeds including crabgrass, annual ryegrass, pigweed, mustard, and lambsquarters were broadcast-seeded in the experiment to insure a stand of weeds in addition to the weed seed population already present in the soil. The soil was culti-packed after the crops and weeds were seeded.

The crop plants, weed species, chemical, chemical rates per acre and time of treatment are indicated in tables 1-27. The crops and weeds in the pre-planting treatments in tables 1-15 were planted 7, 14, and 28 days after the chemicals were applied to the soil surface and disked in on May 21, 1959. A split-split-plot design with chemicals as whole plots 10 x 30 ft, chemical rates as sub-plots 5 x 30 ft, and pre-plantings dates as sub-sub-plots, 5 x 10 ft.

The pre-emergence experiment was a split-split-plot with chemicals as whole plots 10 x 141 ft, chemical rates as sub-plots 5 x 141 ft, and test plants as sub-sub-plots 5 x 6½ ft. The chemicals were applied as pre-emergence sprays May 21 the day after planting (Tables 16-22).

The post-emergence experiment was a split-split-plot design similar to the pre-emergence experiment. The chemicals were applied as post-emergence sprays on June 17, 1959 (Tables 23-28).

The average height in inches of crop and weed species when the post-emergence treatments were applied is shown on page 16.

The chemicals, with the exception of 1-chloro-N-(3,4-dichlorophenyl)-N,N-dimethylformamide, were applied in either 40 gallons of acetone per acre containing 1 percent of the surfactant [polyoxyethylene sorbitan monolaurate] or a mixture of 20 gallons of acetone, plus 20 gallons of water plus 1 percent surfactant to make a total volume of 40 gallons per acre, or in 40 gallons of water per acre. The 1-chloro-N-(3,4-dichlorophenyl)-N,N-dimethylformamide was applied in 6.6 gal/A of No. 2 fuel oil. The carriers for each chemical are given in the table on page 1, 2, and 3.

All rates of application are given on an acid equivalent basis when applicable, and when not applicable, the rates of application are given on an active ingredient basis.

Data presented in tables 1-27 represent a combination of the average of three independent injury ratings using the following scale: 0 = no visible effect; 1,2,3 = slight injury, plants usually recovered with little or no reduction in top growth; 4,5,6 = moderate injury, plants usually recovered but with reduced top growth; 7,8,9 = severe injury, plants usually did not recover;

10 = all plants killed; and the average of three independent ratings on the percentage reduction in stand. The numerical value derived from the combination of these criteria makes it possible to use a single herbicide activity index value to show the effect of each chemical rate on each test species. The range of the herbicide activity index value is from 0 to 100. A herbicide activity index value of 0 means the chemical has no effect on the species, while a value of 100 indicates complete kill. The herbicide activity index value is derived as follows:

$$\frac{(\text{Injury rating score} \times 10) + \text{pct red in stand}}{2} = \text{herbicide activity index value}$$

Secondary Field Evaluation Studies

The objectives of the secondary herbicide evaluation studies are (1) to obtain additional information on the selective herbicidal properties of new chemicals that have shown promise in the primary herbicide evaluation studies at this station or in primary screening programs of the chemical industry and (2) to develop techniques and experimental equipment for the efficient and rapid secondary evaluation of herbicidal chemicals.

Several herbicides were selected for secondary evaluation studies on a number of crops and weeds in 1959. A logarithmic sprayer ^{1/} was used in these studies.

This sprayer was highly satisfactory in accomplishing the objectives listed above. The sprayer also holds promise as a convenient tool for the primary field evaluation of chemicals for their herbicidal properties. Its evaluation for use in the primary and secondary evaluation studies will be continued and expanded.

Field crops used in the secondary studies were alfalfa, birdsfoot trefoil, castorbeans, corn, cotton, oats, peanuts, safflower, sorghum, soybeans, sugar beets, and white clover. They were treated pre- and post-emergence with the following selected herbicides:

- (1) 3-amino-2,5-dichlorobenzoic acid, triethylamine salt [amiben]
- (2) 2-methoxy-4,6-bis(ethylamino)-s-triazine [simetone]
- (3) propyl ethyl-n-butylthiolcarbamate
- (4) 2,3,5,6-tetrachloroterephthalic acid, dimethyl ester
- (5) 4-chloro-2-butyryl N-(3-chlorophenyl)carbamate [barbane]
- (6) 3-(3,4-dichlorophenyl)-1-isopropyl-1-(2-propynyl)urea
- (7) N-(3,4-dichlorophenyl)methylacrylamide

These studies were conducted on a Codorus silt loam. The experiment was not irrigated.

Horticultural crops were studied in a secondary evaluation in an early summer planting and a fall planting.

^{1/} Chesterford Logarithmic Sprayer Mark III manufactured by Fisons Pest Control Limited, Felix Stowe, Suffolk, England.

Horticultural crops used in the summer planting were beets, carrots, cabbage, cucumbers, lettuce, lima beans, onions, peas, snapbeans, spinach, sweet corn, and tomatoes. All crops were direct-seeded and the following herbicides were applied as pre- and post-emergence treatments:

- (1) 3-amino-2,5-dichlorobenzoic acid, triethylamine salt [amiben]
- (2) 2-methoxy-4,6-bis(ethylamino)-s-triazine [simeone]
- (3) propyl ethyl-n-butylthiolcarbamate
- (4) 2,3,5,6-tetrachloroterephthalic acid, dimethyl ester
- (5) 4-chloro-2-butynyl N-(3-chlorophenyl)carbamate [barbane]
- (6) 3-(3,4-dichlorophenyl)-1-isopropyl-1-(2-propynyl)urea
- (7) N-(3,4-dichlorophenyl)methylacrylamide

These studies were conducted in a field consisting of a mixture of Delanco sandy loam and loamy sand equipped for overhead irrigation. The plots were irrigated immediately after treatment and thereafter as needed to insure optimum moisture conditions.

Horticultural crops used in the fall planting were broccoli, cauliflower, collards, upland cress, endive, Hanover salad, kale, lettuce, parsley, spinach, and turnip greens. These crops are normally planted in the late summer or early fall and were therefore selected for this period of planting and evaluation. All crops were direct-seeded and pre- and post-emergence treatments were applied. The herbicides selected for use on these crops included those that showed promise in the summer horticultural crop plantings plus additional herbicides that were promising in the preliminary evaluation studies. The herbicides used were:

- (1) ethyl ethyl-n-butylthiolcarbamate
- (2) n-propyl-di-n-propylthiolcarbamate
- (3) propyl ethyl-n-butylthiolcarbamate
- (4) 2,3,5,6-tetrachloroterephthalic acid, dimethyl ester
- (5) N-(3,4-dichlorophenyl)-2-methylpentanamide
- (6) N-(3,4-dichlorophenyl)methylacrylamide
- (7) N-(3-chloro-4-methylphenyl)-2-methylpentanamide
- (8) 3-amino-2,5-dichlorobenzoic acid, triethylamine salt [amiben]

Rainfall and temperature prior to and after the 1959
pre-planting, pre-emergence, and post-emergence treatments

	Total rainfall	Min. av. temp.	Max. av. temp.
	inches	°F.	°F.
<u>Chemicals applied pre-planting and pre-emergence, May 12, 1959</u>			
30 days prior to treatment	1.92	44.8	69.0
7 days prior to treatment	0.00	47.4	77.0
7 days after treatment	1.21	48.1	69.9
30 days after treatment	3.16	56.3	79.3
<u>Chemicals applied post-emergence, June 10, 1959</u>			
30 days prior to treatment	3.16	55.9	78.7
7 days prior to treatment	1.53	55.3	81.9
7 days after treatment	0.85	56.3	81.0
30 days after treatment	1.42	59.7	85.9

RESULTS AND DISCUSSION

Primary Herbicide Evaluation Studies

The data reported herein are preliminary and are an expression of plant responses to several chemicals applied as soil-incorporated pre-planting, pre-emergence, and post-emergence treatments under the environmental and edaphic conditions of these experiments. These data are therefore not to be interpreted as being final for all environmental and edaphic conditions.

Gladiolus and walnuts emerged over an extended period and their growth was relatively slow. Data on these two species are indicative of initial responses and do not reflect slowly developing responses that may occur during an extended period of time.

The results obtained in the soil-incorporated pre-planting studies in 1959 showed the importance of this new herbicide evaluation technique. Large differences in the herbicidal activity of the chemicals as soil-incorporated treatments were evident. Differential responses due to delayed planting at the selected time interval of 7, 14, and 28 days after treatment with individual chemicals were also apparent. An analysis of the environmental conditions

suggested that soil properties, and incidence and amount of rainfall and irrigation were factors that influenced herbicidal activity or hastened dissipation or inactivation of individual chemicals in the soil-incorporation studies.

Data on the primary evaluation studies are presented as herbicide activity index values as follows: (1) soil-incorporated pre-planting treatments (Tables 1-15); (2) pre-emergence (Tables 16-22); (3) post-emergence (Tables 23-27).

Substituted benzoic acids

Pre-planting, soil-incorporated (Tables 5-9): The substituted benzoic acids and derivatives exhibited a wide range of herbicidal activity on broadleaved weeds and weed grasses. Those of high initial activity showed little reduction in residual activity during the period of one month. In several instances, reduction in herbicidal activity during this period was observed but it was not considered to be significant. Cabbage, cotton, cucumbers, peanuts, and soybeans did not show significant tolerance to any of the active substituted benzoic acids. Corn showed significant tolerance to several of the highly active benzoic acid derivatives at one or more of the pre-planting treatment dates. The methyl- and methoxy-substituted benzoic acid derivatives appeared to possess slightly less residual activity than the corresponding chlorinated derivatives. In some instances the nitro-substitution on the ring significantly decreased the herbicidal activity.

Pre-emergence (Tables 18-19): The variously substituted benzoic acid derivatives as pre-emergence sprays exhibited a wide range of herbicidal activity and specificity. The majority of these compounds were highly active herbicides. Crops that showed tolerance to one or more of the active benzoic acids were castorbeans, corn, cucumbers, gladiolus, lima beans, oats, peanuts, sorghum, soybeans, squash, Sudan grass, and walnuts. 3-Amino-2,5-dichlorobenzoic acid showed significant selectivity and is of special interest. The high level of activity of many of these compounds suggested that they be evaluated as soil sterilants.

Post-emergence (Tables 24-25): In general, post-emergence applications of the herbicidally active substituted benzoic acids and derivatives were effective on most broadleaved weeds. Crops that showed some tolerance to one or more of the active benzoic acids were corn, gladiolus, oats, peanuts, sorghum, Sudan grass, and walnuts. A comparison of several salts of 2-methoxy-3,6-dichlorobenzoic acid showed that the sodium salt of this compound was in general less toxic to corn, oats, sorghum, and Sudan grass than were the organic amine salts.

Substituted phenylacetic acids and derivatives

Pre-planting, soil-incorporated (Tables 9-10): The two substituted phenylacetic acids showed high initial and residual activity on broadleaved weeds and weed grasses. The only crop that showed significant tolerance to these compounds was corn.

Pre-emergence (Tables 19-20): The two substituted phenylacetic acids were highly active on broadleaved weeds and weed grasses. The only crops that showed some tolerance were corn, gladiolus, and walnuts. The high activity of these compounds suggests that they be evaluated as soil sterilants.

Post-emergence (Table 25): Four variously substituted phenylacetic acids and acid derivatives were evaluated for their post-emergence herbicidal activity. The active chemicals in this group controlled broadleaved weeds. Crops that showed tolerance to one or more of the active chemicals were alfalfa, birdsfoot trefoil, castorbeans, corn, cowpeas, gladiolus, lespedeza, oats, red clover, sorghum, Sudan grass, walnuts, and white clover.

s-Triazines

Pre-planting, soil-incorporated (Tables 10-15): The s-triazines exhibited a wide range of initial herbicidal activity and specificity. Their herbicidal activity persisted for a period of at least one month at or near the initial activity. Cabbage and cucumbers did not show a significant tolerance to any of these s-triazines at any of the planting dates. Those crops that showed some tolerance to one or more of the herbicidally active chemicals of this group at one or more of the pre-planting treatment dates were corn, cotton, peanuts, and soybeans.

Pre-emergence (Tables 20-22): A wide range of herbicidal activity and specificity was shown by the s-triazines applied as pre-emergence treatments. Pre-emergence applications of herbicidally effective s-triazines severely injured the small seeded legumes. Buckwheat, castorbeans, cotton, cowpeas, flax, lima beans, oats, peanuts, safflower, sorghum, soybeans, and Sudan grass showed some tolerance to several compounds of this group. Cucumbers and squash showed limited tolerance to 2 of these compounds. Crops that showed the highest tolerance to pre-emergence applications of the s-triazines were corn and gladiolus. Two of the s-triazines showed selectivity on crops with good herbicidal activity on susceptible weed species. These were 2,4-bis(ethylamino)-6-trichloromethyl-s-triazine and 2-ethoxy-4,6-bis(N-isopropylacetamido)-s-triazine. Several of the s-triazines, because of their generally high herbicidal activity appeared promising as soil sterilants.

Post-emergence (Tables 25-27): As post-emergence sprays, the s-triazines exhibited a wide range in herbicidal activity and selectivity. There was a very evident difference in the selectivity in the s-triazines that permits their division into two groups as follows (1) those that were generally active on broadleaved and weed grasses, and (2) those that were active on broadleaved weeds only. Several s-triazines showed promise for the selective control of lambs-quarters and pigweed in a number of crops.

The crops that showed some tolerance to one or more of the s-triazines which were active on broadleaved weeds and weed grasses were corn, flax, gladiolus, peanuts, sorghum, Sudan grass, and walnuts. The crops that showed some tolerance to one or more of the s-triazines which were active on broadleaved weeds only were alfalfa, birdsfoot trefoil, buckwheat, corn, cotton, cowpeas, flax, gladiolus,

lespedeza, lima beans, oats, peanuts, red clover, safflower, snapbeans, sorghum, soybeans, squash, Sudan grass, walnuts, and white clover. Several of the s-triazines should also be evaluated as soil sterilants.

Carbamates

Pre-planting, soil-incorporated (Tables 3-4): The active carbamates controlled both broadleaved weeds and weed grasses at one or more pre-planting treatment dates. Corn, cotton, peanuts, and soybeans were the only crops that showed tolerance to one or more of the carbamates at one or more of the pre-planting treatment dates. The carbamates which possessed high initial herbicidal activity did not exhibit a marked reduction in residual activity during a period of one month.

Pre-emergence (Tables 16-17): The carbamates were active on broadleaved weeds and weed grasses. The only crops that showed tolerance to one or more of the carbamates were castorbeans, corn, gladiolus, lima beans, oats, peanuts, safflower, snapbeans, sugar beets, and walnuts.

Post-emergence (Table 23): In general the post-emergence activity of the carbamates was less than their pre-emergence activity. However, one carbamate, 4-chloro-2-butynyl N-(3-chlorophenyl)carbamate, was active as a post-emergence spray. Crops that showed tolerance to the active carbamates were corn, gladiolus, peanuts, safflower, sugar beets, and walnuts.

Substituted N-phenylamides

Pre-planting, soil-incorporated (Table 4): The three substituted N-phenylamides included in these studies were relatively inactive as soil-incorporated pre-planting treatments.

Pre-emergence (Table 17): The three N-phenylamides were effective in controlling broadleaved weeds and certain weed grasses. Crops that showed tolerance to one or more of these chemicals were alfalfa, birdsfoot trefoil, corn, cotton, cucumber, flax, gladiolus, lima beans, oats, peanuts, red clover, snapbeans, sorghum, and soybeans.

Post-emergence (Table 23): The N-phenylamides were active as post-emergence sprays on broadleaved weeds and weed grasses. Crops that showed tolerance to one or more of these herbicides at high broadcast rates were gladiolus and walnuts.

Substituted phenylurea derivatives

Pre-planting, soil-incorporated (Table 5): The substituted phenylurea derivatives were active as soil-incorporated pre-planting treatments and their residual activity did not diminish appreciably during a one month period. Corn, cotton, and soybeans were the only crops that showed some tolerance to one or more of the compounds at one or more of the pre-planting treatment dates.

Pre-emergence (Tables 17-18): The substituted phenylurea derivatives were effective in controlling broadleaved weeds and weed grasses. The crops that showed some tolerance to one or more of these chemicals were castorbeans, corn, cowpeas, gladiolus, lima beans, oats, peanuts, soybeans, and walnuts. Cotton showed only limited tolerance to these compounds under the climatic and soil conditions of this experiment. The high activity of these chemicals suggests the need for their further evaluation as soil sterilants.

Post-emergence (Tables 23-24): Of the three substituted phenylurea compounds evaluated, two were highly active on broadleaved weeds and weed grasses and one especially effective on broadleaved weeds. Crops that showed some tolerance to one or more of the compounds of this series were gladiolus, sorghum, Sudan grass, and walnuts.

O-2,4-Dichlorophenyl O-methyl isopropylphosphoramidothioate

Pre-planting, soil-incorporated (Table 1): This chemical was relatively ineffective as a soil-incorporated pre-planting treatment.

Pre-emergence (Table 16): This chemical was effective in controlling broadleaved weeds and weed grasses. Crops that showed some tolerance were alfalfa, birdsfoot trefoil, castorbeans, corn, cowpeas, gladiolus, lima beans, oats, peanuts, red clover, safflower, sorghum, soybeans, squash, and walnuts.

Post-emergence (Table 23): This chemical was effective in controlling broadleaved weeds and weed grasses. Crops that showed some tolerance were gladiolus, peanuts, and soybeans.

3,4-Dichloropropionanilide

Pre-planting, soil-incorporated (Table 2): This chemical was active on broadleaved weeds and weed grasses at one or more rates at one or more pre-planting treatment dates. Crops that showed some tolerance were cabbage, corn, cotton, cucumbers, peanuts, and soybeans.

Pre-emergence (Table 16): This chemical was moderately effective on broadleaved weeds and weed grasses. Crops that showed some tolerance were gladiolus and walnuts.

Post-emergence (Table 23): This chemical was active on broadleaved weeds and weed grasses. Tolerance of the grass crops at the high rate of application suggests further evaluation on these crops.

Ethyl-o-nitrophenylsulfide

Pre-planting, soil-incorporated (Table 2): This chemical showed moderate activity on broadleaved weeds and weed grasses. Tolerant crops were corn, cucumbers, and peanuts.

Pre-emergence (Table 16): This chemical was effective on broadleaved weeds and weed grasses. Crops that showed some tolerance were castorbeans, corn, cowpeas, gladiolus, oats, and peanuts.

Post-emergence (Table 23): This chemical was low to moderate in activity.

2,3,5,6-Tetrachloroterephthalic acid, dimethyl ester

Pre-planting, soil-incorporated (Table 2): This chemical showed moderate to high activity on weed grasses and low activity on broadleaved weeds. Crops that showed some tolerance at one or more rates at one or more planting dates were cabbage, corn, cotton, cucumber, peanuts, and soybeans.

Pre-emergence (Table 16): This chemical was very effective on broadleaved weeds and less effective on weed grasses. Crops that showed some tolerance were castorbeans, corn, cowpeas, gladiolus, lima beans, oats, peanuts, safflower, snapbeans, and soybeans.

Post-emergence (Table 23): This chemical exhibited a very low activity as a post-emergence application. It looks very promising on a number of crops as a post-emergence broadcast and/or directed application following clean cultivation.

Dimethylarsinic acid

Post-emergence (Table 27): This chemical was very active and should be evaluated as a soil sterilant.

3-Amino-1,2,4-triazole-ammonium thiocyanate

Post-emergence (Table 27): This chemical was highly active and exhibited little selectivity.

Residual Activity of Herbicides

The experimental fields used for the primary evaluation studies were plowed to a depth of 8 inches on September 3, 1959, and a seedbed was prepared by thorough disking to a depth of 4 inches. Rye (Secale cereale) and vetch (Vicia sp.) were seeded September 16, 1959, as cover crops.

Data on the responses of the cover crops to the residual activity of compounds investigated in the primary herbicide evaluation studies were recorded December 29, 1959.

The chemicals applied as pre-emergence sprays that showed residual toxicity to the cover crops were: 2,4-bis(N-ethylbenzamido)-6-methoxy-s-triazine and 2-diethylamino-4-N-isopropylacetamido-6-methoxy-s-triazine (Table A, page 14). None of the chemicals applied as post-emergence sprays showed residual toxicity to the cover crops.

Secondary Herbicide Evaluation Results

The soils, irrigation practices, cultural methods, and dates of application associated with the secondary field and horticultural crop studies were quite divergent from those involved in the primary field evaluation studies. The data on the secondary evaluation studies will be presented in a separate report.

Herbicides of outstanding interest in the secondary evaluation of herbicides in field crops were:

- (1) 3-amino-2,5-dichlorobenzoic acid, triethylamine salt [amiben]
- (2) propyl ethyl-n-butylthiolcarbamate
- (3) 2,3,5,6-tetrachloroterephthalic acid, dimethyl ester
- (4) 3-(3,4-dichlorophenyl)-1-isopropyl-1-(2-propynyl)urea
- (5) N-(3,4-dichlorophenyl)methylacrylamide

The most promising herbicides used on horticultural crops in the summer planting were:

- (1) 3-amino-2,5-dichlorobenzoic acid, triethylamine salt [amiben]
- (2) propyl ethyl-n-butylthiolcarbamate
- (3) 2,3,5,6-tetrachloroterephthalic acid, dimethyl ester
- (4) 3-(3,4-dichlorophenyl)-1-isopropyl-1-(2-propynyl)urea
- (5) N-(3,4-dichlorophenyl)methylacrylamide

Herbicides of special interest in the fall planting of horticultural crops were:

- (1) ethyl ethyl-n-butylthiolcarbamate
- (2) 2,3,5,6-tetrachloroterephthalic acid, dimethyl ester
- (3) N-(3,4-dichlorophenyl)-2-methylpentanamide
- (4) N-(3,4-dichlorophenyl)methylacrylamide
- (5) N-(3-chloro-4-methylphenyl)-2-methylpentanamide

Table A. The residual activity of several herbicides applied as pre-emergence sprays in the preliminary evaluation. Winter cover crops planted September 16, 1959. Observed December 29, 1959.

Chemical	Rate per acre	Inj. scale value	Vetch Plant kill	Rye Plant kill
	lb.	no.	pct.	pct.
2,4-bis(N-ethylbenzamido)-6-methoxy- <u>s</u> -triazine	8	6.0	30	60
2-diethylamino-4-N-isopropylacetamido-6-methoxy- <u>s</u> -triazine	8	4.0	70	40

SUMMARY

The responses of several test crops and weeds to 77 chemicals applied as soil-incorporated pre-planting, pre-emergence and/or post-emergence treatments are recorded in tables 1-27 and summarized by crops and chemical groups in tables 28-30.

1. The primary evaluation of herbicides as soil-incorporated pre-planting treatments in which crops and weeds were planted at intervals of 7, 14, and 28 days after treatment was an effective technique for determining the initial activity and selectivity of herbicides and for obtaining preliminary information on their residual activity in soils.

2. The logarithmic sprayer was highly effective for use in the secondary evaluation of chemicals for their herbicidal properties and showed excellent potential for adaptation and use in primary evaluation studies.

3. All of the information obtained in the primary evaluation studies is presented in tables 1-27 and a brief generalized summary of crop tolerance and susceptibility of weeds to one or more members of a chemical group is presented in tables 28-30. An "x" opposite a crop under a chemical group indicates that the crop was tolerant to at least one compound in that chemical group. An "x" opposite weeds means that satisfactory control of the weed was achieved with one or more members of the chemical group.

Species and Varietal Names of Crops and Weeds

Common Name	Scientific Name	Variety	Ht. of test species in inches at time of post- emergence treat- ment
1. Alfalfa	<u>Medicago sativa</u>	Atlantic	6
2. Birdsfoot trefoil	<u>Lotus corniculatus</u>	Italian	4
3. Buckwheat	<u>Fagopyrum esculentum</u>	---	5
4. Castorbeans	<u>Ricinus communis</u>	Cimarron	7
5. Corn	<u>Zea mays</u>	US 13	21
6. Cotton	<u>Gossypium hirsutum</u>	Coker 100 WR	4
7. Cowpeas	<u>Vigna sinensis</u>	Mixed	6
8. Cucumber	<u>Cucumis sativus</u>	Marketer	5
9. Flax	<u>Linum usitatissimum</u>	Cascade	6
10. Gladiolus	<u>Gladiolus sp.</u>	Mixed	13
11. Lespedeza	<u>Lespedeza stipulaceae</u>	Climax	7
12. Lima beans	<u>Phaseolus limensis</u>	Beltsville 151	6
13. Oats	<u>Avena sativa</u>	Clinton 59	16
14. Peanuts	<u>Arachis hypogae</u>	Spanish	3
15. Red clover	<u>Trifolium pratense</u>	Kenland	4
16. Safflower	<u>Carthamus tinctorius</u>	Pacific 2	5
17. Snapbeans	<u>Phaseolus vulgaris</u>	Black Valentine	5
18. Sorghum	<u>Sorghum vulgare</u>	Amber	15
19. Soybeans	<u>Soja max</u>	Clark	6
20. Squash	<u>Curcubita pepo</u>	E. S. Crookneck	6
21. Sudan grass	<u>Sorghum vulgare sudanese</u>	Sweet 372	15
22. Sugar beets	<u>Beta vulgaris</u>	SP 55600-01	7
23. Walnuts	<u>Juglans sp.</u>	English and Persian	6
24. White clover	<u>Trifolium repens ladino</u>	Pilgrim	5
25. Crabgrass	<u>Digitaria sanguinalis</u>	---	2
26. Ryegrass	<u>Lolium multiflorum</u>	---	3
27. Lambsquarters	<u>Chenopodium album</u>	---	4
28. Mustard	<u>Brassica kaber</u>	---	14
29. Pigweed	<u>Amaranthus retroflexus</u>	---	4

Table 1. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

	Chemical	2,4-dichlorophenoxyacetic acid, alkanolamine salt [2,4-D]						2-(2,4,5-trichlorophenoxy)propionic acid, alkanolamine salt [Silvex]						4,6-dinitro-o-sec butylphenol, alkanolamine salt [DNBP]						0,2,4-trichlorophenyl 0-methyl isopropylphosphorothioate						
	Rate lb/A	2	4	7	14	28	2	4	7	14	28	4	7	14	28	8	7	14	28	10	7	14	28	7	14	28
Interval between treatment and planting - days		7	14	28			7	14	28			7	14	28			7	14	28			7	14	28		
Crops	%																									
Cabbage	90	77	0	100	80	0	100	93	100	100	100	100	93	0	100	100	0	37	20	0	80	50				
Corn	0	0	0	17	20	0	13	27	27	20	80	50	10	0	20	17	13	0	37	0	60	40				
Cotton	27	17	0	53	30	0	100	33	63	90	60	90	23	0	40	27	20	0	27	0	30	40				
Cucumber	10	17	0	67	40	0	93	93	100	100	100	100	33	10	60	53	30	0	17	0	30	30				
Peanuts	23	0	0	53	10	0	100	57	37	100	93	50	0	0	23	27	20	0	0	0	30	0				
Soybeans	27	10	0	67	30	0	53	30	63	93	50	93	13	0	20	0	0	0	0	0	30	0				
Crop Tox. Av.	30	20	0	60	35	0	77	56	65	84	81	81	30	19	0	44	37	14	0	20	3	0	43	27		
Weeds																										
Ryegrass	23	0	0	33	20	0	43	43	50	73	80	70	23	0	0	50	77	0	37	30	0	70	50			
Grasses	23	0	0	33	20	0	43	43	50	73	80	70	23	0	0	50	77	0	37	30	0	70	50			
Mustard	80	0	0	90	20	0	93	77	93	93	93	100	90	0	0	93	77	0	30	30	0	50	50			
Other B.L.	80	0	0	90	20	0	93	77	93	93	93	100	90	0	0	93	77	0	30	30	0	50	50			
Weed Tox. Av.	52	0	0	62	20	0	68	60	72	83	87	85	57	0	0	72	77	0	34	30	0	60	50			
Total Tox. Av.	38	12	0	60	29	0	73	57	68	84	83	82	41	11	0	55	53	8	0	25	14	0	50	36		

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 2. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

	Chemical	3,4-dichloropropionanilide			ethyl-9-nitrophenylsulfide			2,3,5,6-tetrachloroterephthalic acid, dimethyl ester			isopropyl N-(3-chlorophenyl)-carbamate [CIPC]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	Rate lb/A	4	16		4	8		8	16		4		8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Cabbage	0	27	0	10	50	30	77	93	73	90	100	90	67	100	90																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Corn	20	10	0	20	30	0	27	17	0	47	30	15	57	33	27	57	70	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50

%/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 3. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

	Chemical	4-chloro-2-butyryl N-(3-chloro-phenyl)carbamate [barbane]				ethyl N,N-di-n-propylthiol-carbamate [EPTC]				ethyl ethyl-n-butylthiol-carbamate				n-propyl-di-n-propylthiol-carbamate			
	Rate lb/A	8	16	7	14	28	4	8	4	8	4	8	4	8	4	8	
Interval between treatment and planting - days		7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	
Crops		*/															
Cabbage		17	47	0	57	70	60	100	100	100	100	100	100	100	100	100	
Corn		20	17	27	20	30	30	19	23	17	22	50	40	33	43	23	
Cotton		43	27	47	67	50	70	100	73	83	100	100	100	100	63	93	
Cucumber		17	27	0	57	50	0	100	100	100	100	100	100	100	100	100	
Peanuts		0	0	0	33	50	0	37	30	27	53	50	30	43	23	33	
Soybeans		23	20	23	33	30	30	90	33	37	90	80	60	43	40	37	
Crop Tox. Av.		20	23	16	45	47	32	74	60	61	78	80	72	70	62	64	
Weeds																	
Ryegrass		53	50	30	67	70	50	93	100	93	100	100	100	100	90	93	
Grasses		53	50	30	67	70	50	93	100	93	100	100	100	100	90	93	
Mustard		23	10	30	47	30	50	100	93	100	93	100	93	100	93	90	
Other B.L.		23	10	30	47	30	50	100	93	100	93	100	93	100	93	90	
Weed Tox. Av.		38	30	30	57	50	50	77	97	97	97	97	100	93	92	92	
Total Tox. Av.		27	26	22	50	48	39	83	75	75	85	87	83	81	74	75	

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 4. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

	Chemical	propyl ethyl-n-butylthiol-carbamate						N-(3,4-dichlorophenyl)methyl-acrylamide						N-(3,4-dichlorophenyl)-2-methylpentanamide						N-(3-chloro-4-methylphenyl)-2-methylpentanamide											
	Rate lb/A	4		8		7		14		28		4		8		7		14		28		4		8		7		14		28	
Interval between treatment and planting - days		7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28
Crops																															
Cabbage	%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Corn		10	30	20	20	60	70	17	0	0	20	20	0	17	0	0	33	20	0	20	10	0	23	10	0						
Cotton		100	80	100	100	80	100	0	37	0	14	60	0	17	17	0	24	40	0	27	37	0	23	60	30						
Cucumber		100	100	100	100	100	100	0	17	27	9	40	50	0	27	0	30	50	0	37	40	0	27	70	20						
Peanuts		10	17	47	20	50	80	0	10	0	0	20	0	0	10	0	14	10	0	14	17	0	0	30	0						
Soybeans		17	53	47	57	80	70	17	37	0	14	40	20	30	10	0	37	30	0	27	27	0	33	40	30						
Crop Tox. Av.		56	63	69	66	78	87	7	26	8	14	40	17	13	19	0	29	40	0	24	27	0	22	47	18						
Weeds																															
Ryegrass		93	93	93	100	100	100	0	0	47	0	20	70	0	0	0	17	0	0	67	33	0	0	30	0						
Grasses		93	93	93	100	100	100	0	0	47	0	20	70	0	0	0	17	0	0	50	33	0	0	30	0						
Mustard		93	93	93	93	100	100	0	0	37	0	20	60	0	0	0	17	20	0	0	0	0	0	10	0						
Other B.L.		93	93	93	93	100	100	0	0	37	0	20	60	0	0	0	17	20	0	0	0	0	0	10	0						
Weed Tox. Av.		93	93	93	97	100	100	0	0	42	0	20	65	0	0	0	17	10	0	29	17	0	0	20	0						
Total Tox. Av.		71	75	79	78	87	92	3	16	22	8	32	36	8	11	0	24	28	0	26	23	0	13	36	11						

%/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 5. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

Chemical	3-(3,4-dichlorophenyl)-1,1-dimethylurea [diuron]				1-chloro-N-(3,4-dichlorophenyl)-N,N-dimethylformamide				3-(3,4-dichlorophenyl)-1-isopropyl-1-(2-propynyl)urea				2,3,6-trichlorobenzoic acid, sodium salt [2,3,6-TBA]			
	Rate lb/A	2	4	7	14	28	2	4	7	14	28	4	7	14	28	4
Interval between treatment and planting - days	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7
Crops	%															
Cabbage	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Corn	47	40	47	70	80	100	57	23	17	100	60	30	0	0	27	0
Cotton	37	67	37	73	93	50	60	43	53	100	100	100	17	0	27	33
Cucumber	100	100	100	100	100	100	100	100	100	100	100	100	90	73	43	100
Peanuts	43	43	63	100	100	90	53	93	47	100	100	70	53	37	27	93
Soybeans	100	73	43	100	100	60	100	100	27	100	100	50	33	0	0	40
Crop Tox. Av.	71	66	65	91	96	83	78	77	57	100	93	75	49	35	27	66
Weeds																
Ryegrass	77	93	93	93	93	93	100	93	90	100	93	93	33	77	37	77
Grasses	77	93	93	93	93	93	100	93	90	100	93	93	33	77	37	77
Mustard	100	93	100	100	93	100	100	93	100	100	93	100	67	93	90	93
Other B.L.	100	93	93	100	93	100	100	93	100	100	93	100	67	93	90	93
Weed Tox. Av.	89	93	95	97	93	97	100	93	95	100	93	97	50	34	64	85
Total Tox. Av.	78	77	77	93	95	89	87	83	72	100	93	84	49	54	42	73

%/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 6. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

		2-methyl-5,6-dichlorobenzoic acid, dimethylamine salt						2-methoxy-3,6-dichlorobenzoic acid, sodium salt						2-methoxy-3-chloro-6-methyl- benzoic acid						2,6-dimethoxy-3-chlorobenzoic acid					
	Chemical	4	8	2	4	4	8	4	8	4	8	4	8	4	8	4	8	4	8	4	8	4	8	4	8
	Interval between treatment and planting - days	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28
	Crops	*/																							
	Cabbage	93	100	93	100	100	100	93	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	Corn	67	27	23	90	70	60	3	0	10	23	23	20	33	20	23	53	30	30	23	10	0	35	50	0
	Cotton	93	90	100	100	100	100	100	100	53	100	100	50	93	53	53	100	93	70	63	33	20	93	60	40
	Cucumber	100	100	93	100	100	100	100	100	77	100	100	100	100	100	90	100	100	100	93	93	33	93	100	60
	Peanuts	90	100	33	100	100	70	100	90	33	100	100	70	100	30	30	100	50	50	57	33	0	93	70	30
	Soybeans	100	90	53	100	100	93	100	100	53	100	100	70	93	47	23	100	100	40	63	30	0	93	50	20
	Crop Tox. Av.	91	85	66	98	95	82	83	82	53	87	87	68	87	52	49	92	79	98	57	44	14	83	71	38
	Weeds																								
	Ryegrass	90	90	60	93	93	80	90	90	90	93	90	93	27	27	37	93	90	60	47	37	93	67	50	93
	Grasses	90	90	60	93	93	80	93	90	90	93	90	93	27	27	37	93	90	60	47	37	93	67	50	93
	Mustard	100	93	80	100	93	93	93	93	90	100	93	93	90	53	43	100	93	60	80	27	53	93	40	70
	Other B.I.	100	93	80	100	93	93	93	93	90	100	100	93	90	53	43	100	93	60	80	27	53	100	40	70
	Weed Tox. Av.	95	92	70	97	93	87	92	92	90	97	93	93	59	40	40	97	92	60	64	32	73	100	40	70
	Total Tox. Av.	92	87	68	98	94	87	87	86	69	91	90	78	75	47	46	94	84	63	60	39	38	83	60	56

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 7. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

	Chemical	2-methoxy-3-methyl-5-chloro-benzoic acid						2-methoxy-3-nitro-5-chloro-benzoic acid						2,5-dichloro-3-bromobenzoic acid						2-methoxy-3,5-dibromobenzoic acid								
	Rate lb/A	4	8	7	14	28	4	8	7	14	28	4	8	7	14	28	4	8	7	14	28	4	8	7	14	28		
	Interval between treatment and planting - days	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28
	Crops	*/																										
	Cabbage	100	100	90	100	100	100	27	57	47	80	95	80	43	93	73	93	100	100	27	95	0	20	100	80	20	100	80
	Corn	33	23	0	53	40	30	0	17	0	37	30	20	10	17	0	20	40	0	33	23	0	30	27	20	30	27	20
	Cotton	100	57	27	100	93	50	63	17	27	73	30	40	37	47	67	93	80	70	33	33	0	47	60	0	47	60	0
	Cucumber	23	53	33	40	93	50	27	20	47	30	40	50	43	67	77	93	100	93	57	33	0	93	100	30	93	100	30
	Peanuts	10	0	0	27	30	30	10	17	17	17	30	30	43	37	30	53	60	30	10	10	0	10	20	0	10	20	0
	Soybeans	37	30	0	57	70	20	63	17	0	73	30	20	40	37	27	73	70	30	50	23	0	59	50	20	59	50	20
	Crop Tox. Av.	51	44	25	63	71	47	32	24	23	52	43	40	36	50	46	71	75	54	35	36	0	43	60	25	35	36	0
	Weeds																											
	Ryegrass	23	90	90	73	93	93	23	17	20	30	33	30	23	47	27	43	70	50	10	10	0	27	33	0	10	10	0
	Grasses	23	90	90	73	90	93	23	17	20	30	33	30	23	47	27	43	70	50	10	10	0	27	30	0	10	10	0
	Mustard	93	73	67	100	90	80	13	17	17	13	30	30	77	23	27	93	70	50	23	13	0	47	50	0	23	13	0
	Other B.L.	93	73	70	93	90	80	13	17	17	13	30	30	70	23	27	90	70	50	23	13	0	47	47	0	23	13	0
	Weed Tox. Av.	58	82	79	85	91	87	18	17	19	22	32	30	48	35	27	67	70	50	15	12	0	37	40	0	15	12	0
	Total Tox. Av.	54	59	47	72	79	63	26	21	21	40	38	36	41	44	38	69	73	53	27	26	0	41	52	15	27	26	0

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 9. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

	Chemical	2-methoxy-3,6-dichloro-5-nitrobenzoic acid				2,6-dimethoxy-3,5-dichlorobenzoic acid				5-nitro-2,3,6-trichlorobenzoic acid, dimethylamine salt				2,3,6-trichlorophenylacetic acid, sodium salt [fenac]					
	Rate lb/A	4	8	7	14	28	4	7	14	28	4	7	14	28	2	7	14	28	4
Interval between treatment and planting - days		7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28
Crops	%																		
Cabbage	0	23	0	0	33	0	93	73	93	90	80	43	33	100	93	93	100	100	100
Corn	14	23	0	20	33	0	5	0	33	20	13	17	17	23	30	23	27	47	50
Cotton	0	23	0	43	43	0	90	53	27	93	90	67	43	100	90	100	100	100	100
Cucumber	0	13	0	17	37	0	100	93	80	100	100	93	50	100	100	100	100	100	100
Peanuts	0	0	0	27	30	0	73	43	17	93	53	40	23	90	60	100	93	100	100
Soybeans	37	0	0	40	40	0	60	47	17	93	93	80	80	67	33	90	90	100	100
Crop Tox. Av.	9	14	0	25	36	0	70	55	36	85	73	60	64	55	34	84	77	57	92
Weeds																			
Ryegrass	10	43	0	40	57	0	10	43	33	70	40	30	53	30	93	93	93	93	93
Grasses	10	43	0	40	57	0	10	43	33	70	40	30	53	30	93	93	93	93	93
Mustard	10	10	0	23	27	0	73	90	80	93	80	43	47	40	100	100	100	100	100
Other B.I.	10	10	0	23	27	0	73	90	80	93	90	43	47	40	100	100	100	100	100
Weed Tox. Av.	10	27	0	32	42	0	42	67	57	62	81	75	42	34	35	73	50	40	97
Total Tox. Av.	9	19	0	27	38	0	59	60	44	76	76	66	55	46	34	89	66	50	94

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 10. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

Chemical	2-methoxy-3,6-dichlorophenyl- acetic acid			2-chloro-4,6-bis(ethylamino)-s- triazine [simeazine]			2-allylamino-4-chloro-6-iso- propylamino-s-triazine			2-chloro-4-ethylamino-6-diethyl- amino-s-triazine [trietazine]		
	Rate lb/A	4	8	4	8	4	4	8	4	4	8	8
Interval between treatment and planting - days	7 14 28	7 14 28	7 14 28	7 14 28	7 14 28	7 14 28	7 14 28	7 14 28	7 14 28	7 14 28	7 14 28	7 14 28
<u>Crops</u>	%											
Cabbage	100	100	100	100	100	100	93	100	100	100	100	100
Corn	23	50	33	50	70	50	10	37	23	14	73	90
Cotton	100	93	100	100	100	100	73	50	53	100	80	93
Cucumber	100	100	100	100	100	100	100	100	90	100	100	100
Peanuts	53	53	43	100	93	90	33	53	63	100	100	100
Soybeans	93	93	53	100	100	100	37	33	33	93	93	80
Crop Tox. Av.	78	82	72	92	94	90	59	61	60	79	69	85
												83
<u>Weeds</u>												
Ryegrass	93	90	90	93	93	90	53	77	80	93	93	93
Grasses	93	90	90	93	93	90	53	77	80	93	93	90
Mustard	93	93	100	100	100	100	90	90	93	100	100	100
Other B.L.	93	93	100	100	100	95	90	90	93	100	93	100
Weed Tox. Av.	93	92	95	97	97	95	72	84	87	97	97	95
Total Tox. Av.	84	86	81	94	95	92	64	70	71	86	80	91
												92
												88

* / Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 11. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

	Chemical	2-chloro-4-ethylamino-6-(3-methoxypropylamino)-s-triazine				2-chloro-4-isopropylamino-6-(3-methoxypropylamino)-s-triazine				2-diethylamino-4-N-isopropylacetamido-6-methoxy-s-triazine				2-N-ethylacetamido-4-N-isopropylacetamido-6-methoxy-s-triazine			
		4	8			4	8			4	8			4	8		
Interval between treatment and planting - days	Rate lb/A	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	
Crops																	
Cabbage	*/	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Corn	14	37	33	70	27	70	70	23	43	33	20	40	20	33	60	40	
Cotton	100	77	100	100	100	100	100	100	100	93	23	37	37	50	60	80	
Cucumber	100	100	100	100	100	100	100	100	100	100	100	100	90	100	100	100	
Peanuts	43	77	63	80	73	100	80	100	93	93	100	100	63	30	27	100	
Soybeans	93	100	90	100	100	100	100	100	100	93	23	43	27	47	80	40	
Crop Tox. Av.		75	82	81	83	95	92	87	89	85	87	97	90	55	58	50	
Weeds																	
Ryegrass	93	90	93	93	93	93	93	93	93	93	83	80	90	90	90	93	
Grasses	93	90	93	93	93	93	93	93	93	93	83	80	90	90	90	90	
Mustard	100	93	100	100	100	100	100	100	100	100	80	90	93	93	100	100	
Other B.I.	100	93	100	100	100	100	100	100	100	100	80	90	93	93	100	100	
Weed Tox. Av.		97	92	97	97	97	97	97	97	97	82	85	92	92	95	97	
Total Tox. Av.		84	86	87	89	96	94	91	92	90	66	69	67	80	83	80	

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 12. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

Chemical	2,4-bis(N-ethylacetamido)-6-methoxy-s-triazine				2-ethylamino-4,6-bis(isopropylamino)-s-triazine				2,4-bis(ethylamino)-6-isopropylamino-s-triazine				2-ethylamino-4-isopropylamino-6-methylamino-s-triazine			
	4	8	14	28	4	8	14	28	4	8	14	28	4	8	14	28
Interval between treatment and planting - days	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7
Crops	%															
Cabbage	100	93	100	100	100	100	100	100	100	93	100	100	100	93	100	93
Corn	10	27	27	14	60	50	0	47	17	10	70	30	10	53	20	30
Cotton	20	37	40	43	60	60	33	50	37	53	60	50	43	43	20	27
Cucumber	100	100	53	100	100	100	17	47	27	27	70	30	27	93	0	37
Peanuts	27	27	27	47	50	50	20	20	27	30	60	30	27	40	23	60
Soybeans	23	40	23	90	70	93	7	27	27	37	50	30	27	27	17	40
Crop Tox. Av.	47	54	45	66	73	76	16	40	30	31	63	37	27	58	24	37
Weeds																
Ryegrass	80	67	33	93	93	50	17	27	47	27	50	80	23	47	47	37
Grasses	80	67	33	93	93	50	17	27	47	27	50	80	23	47	47	37
Mustard	90	70	73	93	93	93	0	20	47	10	40	70	27	27	27	27
Other B.L.	90	70	73	93	93	93	0	20	47	10	40	70	27	27	27	27
Weed Tox. Av.	85	69	53	93	93	72	9	24	47	19	45	75	25	37	37	32
Total Tox. Av.	62	60	48	77	81	74	13	33	37	26	56	52	26	50	29	35

%/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 13. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

	Chemical	2-ethylamino-4-isopropylamino-6-methylmercapto-s-triazine				2,4-bis(ethylamino)-6-methylmercapto-s-triazine				2,4-bis(N-ethylbenzamido)-6-methoxy-s-triazine				2,4-bis(ethylamino)-6-tri-chloromethyl-s-triazine									
		4	8			4	8			4	8			4	8								
Interval between treatment and planting - days	Rate lb/A	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28	7	14	28				
Crops		*/																					
Cabbage	100	100	100	100	100	100	100	100	100	93	73	100	100	Not Applied	47	90	63	57*	80	80	73	100	77
Corn	43	67	67	90	90	100	100	17	19	37	90	90	93	53	27	0	63	50	20	63	50	0	0
Cotton	23	17	20	93	60	30	27	23	17	43	30	20	20	30	17	17	30	40	40	43	70	30	
Cucumber	100	100	100	100	100	100	100	73	100	100	100	100	100	47	93	27	47	93	50	80	100	33	
Peanuts	47	93	100	100	100	100	100	17	100	73	53	100	100	14	30	17	27	50	30	47	70	20	
Soybeans	47	93	63	100	100	100	100	27	23	23	100	100	80	Not Applied	37	17	37	47	20	50	50	40	10
Crop Tox. Av.		60	78	75	97	92	88	34	53	57	77	87	82		38	46	27	45	56	45	59	72	28
Weeds																							
Ryegrass	43	90	63	93	93	80	43	53	30	93	93	50	50	Not Applied	17	0	47	37	0	50	37	10	27
Grasses	43	90	63	93	93	80	43	53	30	93	93	50	50		17	0	47	37	0	50	37	20	27
Mustard	93	90	80	100	100	100	43	53	23	93	93	40	40		17	10	57	37	40	80	57	90	27
Other B.I.	93	90	80	100	100	100	43	53	23	93	93	40	40		17	10	57	37	40	80	57	90	27
Weed Tox. Av.		68	90	72	97	97	90	43	53	27	93	93	45		17	5	52	37	20	65	47	53	27
Total Tox. Av.		63	83	74	97	94	89	38	59	45	83	89	67		30	29	37	42	41	53	54	64	28

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 14. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

Chemical	2-ethoxy-4,6-bis(N-isopropyl- acetamido)-s-triazine			2-isopropylamino-4-methylamino- 6-methylmercapto-s-triazine			2,4-bis(isopropylamino)-6- methylmercapto-s-triazine			2-methoxy-4-diethylamino-6- isopropylamino-s-triazine		
	4	7	8	4	7	8	4	7	8	4	7	8
Interval between treatment and planting - days	7	14	28	7	14	28	7	14	28	7	14	28
Crops	*/											
Cabbage	73	93	73	100	93	43	100	100	100	100	100	100
Corn	0	43	33	23	33	77	90	93	100	33	0	43
Cotton	13	20	17	30	40	40	77	33	23	3	17	27
Cucumber	73	93	43	93	100	70	90	67	43	93	53	57
Peanuts	13	43	0	13	80	20	90	67	43	93	53	57
Soybeans	13	17	17	37	20	70	90	100	100	3	20	10
Crop Tox. Av.	31	52	31	47	73	64	80	71	55	55	54	49
Weeds												
Ryegrass	23	27	67	23	50	90	93	90	53	53	57	50
Grasses	23	27	67	23	50	90	93	90	53	53	57	50
Mustard	23	63	43	50	93	70	100	93	90	90	93	100
Other B.I.	23	63	43	50	93	70	100	93	90	90	93	100
Weed Tox. Av.	23	45	55	37	72	80	97	92	43	72	75	75
Total Tox. Av.	28	49	40	43	73	71	87	79	62	62	62	59

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 15. The effect of several chemicals as pre-planting soil-incorporated treatments on several crops and weeds.

Chemical	2-methoxy-4,6-bis(ethylamino)- is-triazine [simetone]			2-methoxy-4,6-bis(3-methoxy- propylamino)-is-triazine								
	4	8	4	8	4	8	4	8	4	8	4	8
Interval between treatment and planting - days	7	14	28	7	14	28	7	14	28	7	14	28
Crops												
Cabbage	100	100	100	100	100	100	100	100	100	90	100	100
Corn	17	27	50	53	70	93	33	20	10	43	40	30
Cotton	23	20	53	27	80	80	23	33	43	80	100	100
Cucumber	100	93	53	100	100	100	100	100	100	100	100	100
Peanuts	23	27	53	37	80	93	20	23	47	37	93	70
Soybeans	33	27	23	93	80	80	30	10	27	93	100	60
Crop Tox. Av.	49	49	55	68	85	91	51	48	55	74	89	77
Weeds												
Ryegrass	53	57	60	87	90	80	23	90	57	77	93	80
Grasses	53	57	60	87	90	80	23	90	57	77	93	80
Mustard	93	93	90	90	93	93	73	63	43	90	90	60
Other B.L.	93	93	90	90	93	93	73	63	43	90	90	60
Weed Tox. Av.	73	75	75	89	92	87	48	77	50	83	92	70
Total Tox. Av.	59	59	63	76	88	89	50	59	53	78	90	74

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 16. The effect of several chemicals as pre-emergence treatments on several crops and weeds.

	2,4-dichlorophenoxyacetic acid, alkylamine salt [2,4-D]		2-(2,4,5-trichlorophenoxy)-propionic acid, alkylamine salt [Silvex]		4,6-dinitro-2-sec butylphenol, alkylamine salt [DNBP]		0-2,4-dichlorophenyl O-methyl isopropylphosphoramidate		3,4-dichloropropionanilide		ethyl-o-nitrophenylsulfide		2,3,5,6-tetrachloroterephthalic acid, dimethyl ester		isopropyl N-(3-chlorophenyl)-carbamate [CIPC]		4-chloro-2-butyl N-(3-chlorophenyl)-carbamate [barbane]		
Chemical	Rate lb/A	2	4	8	10	20	4	16	4	8	16	4	8	8	16	4	8	8	16
Crops		%																	
Alfalfa	100	100	100	100	100	100	63	93	93	67	90	95	100	100	57	53	90	47	57
B-ft. trefoil	100	100	100	100	100	50	63	90	92	50	90	80	93	93	53	63	93	37	53
Buckwheat	91	93	100	100	93	93	93	92	100	60	90	43	60	60	90	100	100	93	90
Castorbeans	30	80	63	67	20	40	37	57	14	50	33	23	50	23	33	47	67	23	43
Corn	43	63	83	100	20	57	23	43	20	83	50	14	15	27	43	23	53	30	50
Cotton	93	100	100	100	67	90	60	80	60	30	50	20	60	90	93	63	60	37	90
Cowpeas	70	93	100	100	27	30	30	50	45	80	63	57	50	30	50	47	60	70	90
Cucumber	100	100	100	100	47	77	43	77	77	80	77	20	83	60	93	100	60	37	90
Flax	93	100	100	100	93	93	60	83	57	93	93	77	93	77	93	100	100	53	80
Gladiolus	5	7	14	4	0	5	0	5	0	5	5	5	5	14	14	5	10	90	93
Lespedeza	100	100	100	93	90	100	90	100	93	100	100	93	100	100	100	100	100	90	25
Lima beans	50	80	93	27	20	40	33	63	37	67	63	20	67	47	43	27	47	23	93
Oats	53	80	90	27	17	47	20	53	53	50	53	23	43	50	53	93	93	33	50
Peanuts	43	73	100	20	23	43	20	37	20	50	90	80	93	37	33	63	43	25	73
Red clover	100	100	100	63	20	50	53	90	80	67	60	40	93	67	53	63	93	37	50
Safflower	100	100	100	100	20	47	37	73	37	47	73	37	40	60	70	60	80	37	50
Snapbeans	73	90	93	33	20	47	30	63	63	50	63	37	60	50	57	27	67	23	50
Sorghum	73	93	80	50	23	40	23	43	43	70	63	70	90	90	70	47	87	33	53
Soybeans	90	93	100	60	27	47	33	67	37	53	53	37	80	37	73	63	90	33	53
Squash	90	93	100	17	17	57	33	67	33	80	53	53	90	90	100	60	90	33	50
Sudan grass	93	93	100	33	37	100	33	77	33	77	77	47	90	90	100	67	90	23	50
Sugar beets	93	100	100	93	93	100	17	27	33	93	93	70	90	90	100	67	90	23	50
Walnuts	73	90	100	100	17	47	17	27	100	40	100	40	90	90	67	67	90	23	50
White clover	100	100	100	63	57	77	93	100	93	77	100	100	100	100	67	63	93	70	90
Crop Tox. Av.	77	88	95	47	70	59	41	65	49	71	63	58	79	43	61				
Weeds																			
Crabgrass	---	73	93	67	90	80	43	77	93	93	53	---	93	---	---	---	---	---	---
Ryegrass	17	47	73	67	90	90	43	73	77	93	93	---	93	---	---	---	---	---	---
Other grasses	17	47	80	93	80	90	57	77	93	100	93	---	93	---	---	---	---	---	---
Lambquarters	93	100	100	93	100	100	43	90	93	100	100	---	93	---	---	---	---	---	---
Mustard	100	100	100	100	60	90	57	77	93	100	93	---	93	---	---	---	---	---	---
Pigweed	93	100	100	93	80	100	57	77	93	100	100	---	93	---	---	---	---	---	---
Other broadleaf	90	93	100	90	93	93	40	80	93	93	80	---	93	---	---	---	---	---	---
Weed Tox. Av.	68	81	97	85	96	81	47	79	93	98	66	80	94	80	90				
Total Tox. Av.	76	87	95	54	75	46	66	42	68	58	76	64	82	50	67				

* / Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 17. The effect of several chemicals as pre-emergence treatments on several crops and weeds.

Crops	Chemical	ethyl N,N-di-n-propylthiol-carbamate [EPIC]		ethyl ethyl-n-butylthiol-carbamate		n-propyl-di-n-propylthiol-carbamate		propyl ethyl-n-butylthiol-carbamate		N-(3,4-dichlorophenyl)methyl-acrylamide		N-(3-chloro-4-methylphenyl)-2-methylpentanamide		3-(3,4-dichlorophenyl)-1,1-dimethylurea [dituron]		1-chloro-N-(3,4-dichlorophenyl)-N,N-dimethylformamide	
		4	8	4	8	4	8	4	8	4	8	4	8	2	4	2	4
Alfalfa		67	87	63	90	80	90	60	80	60	90	43	73	100	100	100	100
B-ft. trefoil		90	95	63	90	90	93	67	90	93	93	70	93	100	100	100	100
Buckwheat		93	100	63	100	100	100	57	77	47	67	60	80	93	100	70	77
Castorbeans		93	93	67	90	63	90	37	67	37	67	17	47	93	57	27	77
Corn		18	90	37	57	30	63	30	53	5	19	17	47	77	80	90	90
Cotton		93	100	47	77	63	93	53	80	57	77	63	83	77	60	90	90
Cowpeas		70	90	50	100	93	100	100	57	40	47	50	73	100	100	100	100
Cucumber		100	100	93	100	93	100	100	100	40	70	47	70	90	90	90	90
Flax		57	77	93	100	77	93	67	90	90	93	57	90	100	100	100	100
Gladiolus		30	80	15	50	19	59	19	22	9	14	5	10	5	9	14	14
Lespedeza		100	100	77	93	93	100	93	100	93	93	100	100	100	100	100	100
Lima beans		53	90	23	43	43	63	33	53	20	50	20	50	93	90	93	93
Oats		100	100	100	100	100	100	93	100	37	57	37	53	47	37	57	57
Peanuts		33	57	33	60	33	60	23	50	14	37	23	53	53	33	55	55
Red clover		90	93	63	90	90	93	67	90	90	93	53	80	100	100	100	100
Safflower		40	70	33	53	33	53	27	57	37	63	47	67	93	93	93	93
Snapbeans		23	57	33	53	33	53	47	70	43	43	30	43	73	100	93	93
Sorghum		100	100	100	100	100	100	100	100	47	70	33	63	100	100	100	100
Soybeans		53	80	53	73	60	80	47	77	23	43	17	40	53	37	67	80
Squash		90	93	63	83	90	100	67	90	37	57	37	63	100	100	100	100
Sudan grass		100	100	100	100	100	100	100	100	57	77	59	77	100	100	100	100
Sugar beets		93	93	43	70	93	100	43	63	60	83	60	90	100	100	100	100
Walnuts		93	100	100	100	100	100	12	20	73	90	57	87	62	27	47	100
White clover		90	93	53	90	90	93	60	90	100	100	100	100	100	100	100	100
Crop Tox. Av.		74	89	61	80	73	86	56	74	50	67	45	66	78	90	74	82
Weeds																	
Crabgrass		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ryegrass		100	100	100	100	100	100	100	100	23	43	27	47	93	100	100	100
Other grasses		100	100	100	100	100	100	100	100	53	80	90	93	100	100	100	100
Lambsquarters		100	100	93	100	93	100	87	93	55	80	100	100	100	100	100	100
Mustard		100	100	80	93	93	100	100	100	30	60	90	93	100	100	100	100
Pigweed		100	100	90	93	100	100	93	100	53	80	90	93	100	100	100	100
Other broadleaf		93	93	90	93	100	100	93	100	43	60	50	70	90	93	93	93
Weed Tox. Av.		99	99	92	95	99	100	94	99	43	67	64	75	97	99	99	99
Total Tox. Av.		79	91	67	83	78	89	64	79	48	67	49	68	82	92	79	86

* / Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 18. The effect of several chemicals as pre-emergence treatments on several crops and weeds.

Crops	Chemical	3-(3,4-dichlorophenyl)-1-isopropyl-1-(2-propenyl)urea		2,3,6-trichlorobenzoic acid, sodium salt [2,3,6-TBA]		2-methyl-3,6-dichlorobenzoic acid, dimethylamine salt		2-methoxy-3,6-dichlorobenzoic acid, sodium salt		2-methoxy-3-chloro-6-methyl-benzoic acid		2,6-dimethoxy-3-chloro-benzoic acid		2-methoxy-3-methyl-5-chloro-benzoic acid		2-methoxy-3-nitro-5-chloro-benzoic acid		2,5-dichloro-3-bromobenzoic acid	
		4	8	2	4	4	8	2	4	4	8	4	8	4	8	4	8	4	8
	Rate lb/A																		
	%																		
Alfalfa	90	93	100	100	100	100	100	100	100	100	100	90	93	100	100	14	43	90	93
B-ft. trefoil	90	93	100	100	100	100	100	100	100	100	100	93	100	100	100	60	80	90	93
Buckwheat	70	90	93	100	100	100	100	100	100	100	100	60	100	100	100	47	67	90	93
Castorbeans	20	40	93	100	100	100	100	100	100	100	100	30	100	100	100	30	60	47	77
Corn	20	37	0	100	100	100	100	100	100	100	100	10	100	100	100	0	24	37	67
Cotton	67	90	100	100	100	100	100	100	100	100	100	10	100	100	100	80	93	90	93
Cowpeas	23	40	100	100	100	100	100	100	100	100	100	47	100	100	100	37	67	47	77
Cucumber	93	100	100	100	100	100	100	100	100	100	100	93	100	100	100	40	53	93	100
Flax	43	90	100	100	100	100	100	100	100	100	100	33	100	100	100	20	40	87	93
Gladiolus	0	5	0	100	100	100	100	100	100	100	100	5	100	100	100	0	0	9	29
Lespedeza	93	100	100	100	100	100	100	100	100	100	100	100	100	100	100	60	80	100	100
Lima beans	30	70	100	100	100	100	100	100	100	100	100	100	100	100	100	20	31	40	70
Oats	27	47	93	100	100	100	100	100	100	100	100	33	100	100	100	37	77	53	53
Peanuts	17	27	100	100	100	100	100	100	100	100	100	37	100	100	100	17	37	53	80
Red clover	90	93	100	100	100	100	100	100	100	100	100	93	100	100	100	60	80	90	93
Safflower	40	63	100	100	100	100	100	100	100	100	100	57	100	100	100	40	67	80	93
Snapbeans	37	63	100	100	100	100	100	100	100	100	100	57	100	100	100	37	67	57	90
Sorghum	33	53	70	100	100	100	100	100	100	100	100	50	100	100	100	37	67	60	90
Soybeans	27	47	100	100	100	100	100	100	100	100	100	80	100	100	100	40	70	77	90
Squash	70	93	100	100	100	100	100	100	100	100	100	90	100	100	100	60	80	90	93
Sudan grass	43	63	90	100	100	100	100	100	100	100	100	60	100	100	100	20	60	93	100
Sugar beets	93	100	100	100	100	100	100	100	100	100	100	50	100	100	100	15	25	93	100
Walnuts	17	27	27	100	100	100	100	100	100	100	100	18	100	100	100	15	25	93	100
White clover	93	100	100	100	100	100	100	100	100	100	100	100	100	100	100	70	90	100	100
Crop Tox. Av.	51	68	86	90	94	95	95	84	92	86	90	60	74	67	81	36	56	69	85
Weeds																			
Crabgrass	---	---	---	---	---	---	---	100	100	60	90	40	60	40	70	30	50	50	77
Ryegrass	90	93	83	91	90	93	93	90	93	60	87	40	60	40	70	27	47	93	100
Other grasses	90	93	100	100	90	100	100	100	100	80	93	40	60	40	70	27	47	93	93
Lambquarters	100	100	100	100	100	100	100	100	100	100	100	33	63	90	93	40	70	93	100
Mustard	100	100	90	93	100	100	100	90	93	100	100	33	63	90	93	30	60	93	100
Pigweed	100	100	100	100	100	100	100	100	100	100	100	60	90	90	93	40	70	93	100
Other broadleaf	80	90	93	93	93	100	100	93	100	100	100	60	90	90	93	40	70	90	93
Weed Tox. Av.	93	96	93	95	96	99	99	94	97	86	96	48	73	69	84	33	59	85	94
Total Tox. Av.	60	73	88	91	94	96	96	86	93	86	91	57	74	68	81	35	57	73	87

%/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 19. The effect of several chemicals as pre-emergence treatments on several crops and weeds.

	Chemical	2-methoxy-3,5-dibromobenzoic acid		2-methoxy-3,5-dinitrobenzoic acid		3-amino-2,5-dichlorobenzoic acid, triethylamine salt [amiben]		2-methoxy-3,5-dichloro-6-bromobenzoic acid		2-methoxy-3,5-dichloro-6-nitrobenzoic acid		2-methoxy-3,6-dichloro-5-nitrobenzoic acid		2,6-dimethoxy-3,5-dichlorobenzoic acid		5-nitro-2,3,6-trichlorobenzoic acid, dimethylamine salt		2,3,6-trichlorophenylacetic acid, sodium salt [fenac]	
		Rate lb/A	4	8	4	8	4	8	4	8	4	8	4	8	4	8	2	4	
Crops		%																	
Alfalfa		80	93	37	57	100	100	100	100	23	80	63	90	100	100	100	100	100	100
B-ft. trefoil		80	93	37	57	100	100	100	100	53	80	70	90	100	100	100	100	100	100
Buckwheat		43	55	27	47	100	100	90	93	20	30	33	70	92	80	90	93	93	93
Castorbeans		30	50	23	43	57	67	53	83	50	80	50	80	77	70	70	93	93	100
Corn		33	57	27	43	100	100	20	50	0	18	17	33	22	55	73	19	53	53
Cotton		93	100	77	93	100	100	93	100	40	73	63	83	93	100	100	93	93	100
Cowpeas		47	73	30	57	93	80	93	100	80	93	50	77	77	93	70	100	100	100
Cucumber		63	93	67	87	93	93	100	100	0	90	30	60	100	100	100	100	100	100
Flax		73	93	10	15	100	100	100	100	33	53	70	90	93	100	93	93	100	100
Gladiolus		0	12	10	15	100	100	10	25	0	0	14	24	5	14	9	20	30	30
Leopedeza		93	100	73	90	100	100	100	100	80	93	80	93	100	100	100	100	100	100
Lima beans		40	60	23	43	100	100	100	100	0	0	33	60	93	100	80	100	100	100
Oats		27	57	23	43	100	100	60	93	17	37	60	90	80	87	67	93	93	93
Peanuts		20	57	27	47	100	100	93	100	17	50	60	90	93	93	70	93	93	100
Red clover		80	93	37	57	100	100	100	100	60	90	80	93	100	100	100	100	100	100
Safflower		50	90	57	83	90	100	100	100	53	80	90	93	93	100	90	93	93	100
Snapbeans		45	80	47	67	37	60	100	100	40	70	43	60	63	90	90	93	93	100
Sorghum		9	29	37	53	93	93	90	93	10	29	40	60	93	100	90	93	93	100
Soybeans		50	90	47	77	17	39	100	100	15	54	80	93	93	100	100	100	100	100
Squash		40	58	43	63	100	100	100	100	53	83	77	90	93	100	90	93	93	100
Sudan grass		9	29	37	57	100	100	90	93	10	29	47	67	93	100	100	100	100	100
Sugar beets		37	93	23	43	100	100	30	40	17	67	43	90	93	100	100	100	100	100
Walnuts		14	40	5	10	100	100	100	100	14	0	77	80	93	93	87	20	67	67
White clover		90	100	37	57	100	100	100	100	80	93	70	90	100	100	100	100	100	100
Crop Tox. Av.		52	71	39	56	68	78	84	90	32	57	56	78	84	91	86	87	93	93
Weeds																			
Crabgrass		30	60	30	40	---	---	70	90	0	10	20	50	50	70	---	---	---	---
Ryegrass		30	57	23	43	90	93	80	90	0	10	20	47	50	70	73	93	93	93
Other grasses		30	57	23	43	100	100	100	100	0	10	20	47	50	70	100	100	100	100
Lambquarters		80	90	27	47	100	100	100	100	40	70	35	60	92	93	100	100	100	100
Mustard		80	93	20	30	93	100	93	100	10	43	70	90	93	100	100	100	100	100
Pigweed		80	90	27	47	100	100	100	100	40	70	70	90	93	100	93	100	100	100
Other broadleaf		80	90	27	47	93	93	100	100	33	53	70	90	93	100	93	100	100	100
Weed Tox. Av.		63	80	25	42	96	98	89	96	18	38	44	68	74	86	92	98	98	98
Total Tox. Av.		54	72	36	53	73	82	85	91	29	53	53	76	82	90	80	89	94	94

% Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 20. The effect of several chemicals as pre-emergence treatments on several crops and weeds.

Chemical	2-methoxy-3,6-dichlorophenyl- acetic acid		2-chloro-4,6-bis(ethylamino)- [s-triazine]		2-allylamino-4-chloro-6-iso- propylamino-s-triazine		2-chloro-4-ethylamino-6-di- ethylamino-s-triazine [tri- ethylamino]		2-chloro-4-ethylamino-6-(3- methoxypropylamino)-s-triazine		2-chloro-4-isopropylamino-6-(3-methoxypropylamino)-s- triazine		2-diethylamino-4-N-isopropyl- acetamido-6-methoxy-s-triazine		2-N-ethylacetamido-4-N-iso- propylacetamido-6-methoxy- s-triazine		2,4-bis(N-ethylacetamido)-6- methoxy-s-triazine	
	4	8	4	8	4	8	4	8	4	8	4	8	4	8	4	8	4	8
Crops																		
Alfalfa	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
B-ft. trefoil	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Buckwheat	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Castorbeans	63	90	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Corn	53	73	5	10	57	90	93	100	100	100	100	100	100	100	100	100	100	100
Cotton	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Corpeas	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Cucumber	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Flax	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Gladolus	9	10	5	5	4	6	14	100	100	100	100	100	100	100	100	100	100	100
Lespedeza	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Lima beans	90	93	93	100	53	90	100	100	100	100	100	100	100	100	100	100	100	100
Oats	93	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Peanuts	93	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Red clover	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Safflower	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Snapbeans	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Sorghum	93	100	90	93	77	77	77	100	100	100	100	100	100	100	100	100	100	100
Soybeans	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Squash	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Sudan grass	93	100	93	100	50	77	90	100	100	100	100	100	100	100	100	100	100	100
Sugar beets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Walnuts	14	24	53	72	19	29	24	90	9	14	14	100	93	19	37	67	20	47
White clover	100	100	100	100	100	100	100	100	100	100	100	100	83	83	100	100	100	100
Crop Tox. Av.	88	91	89	91	69	84	81	90	84	89	85	90	43	67	71	88	45	62
Weeds																		
Crabgrass	93	100	100	100	---	---	100	100	---	---	---	---	---	---	---	---	---	---
Ryegrass	93	100	100	100	93	100	100	100	93	100	100	100	90	93	90	93	43	90
Other grasses	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Lambquarters	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mustard	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Pigweed	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Other broadleaf	100	100	100	100	100	100	100	100	100	100	100	100	90	100	93	100	90	93
Weed Tox. Av.	98	100	100	100	98	100	100	100	99	100	100	100	95	98	96	98	79	96
Total Tox. Av.	90	93	92	96	75	87	85	92	87	91	88	92	54	73	76	90	52	69

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 21. The effect of several chemicals as pre-emergence treatments on several crops and weeds.

Chemical	2-ethylamino-4,6-bis(iso-propylamino)-s-triazine		2-ethylamino-4-isopropylamino-6-methylamino-s-triazine		2-ethylamino-4-isopropylamino-6-methylmercaptos-triazine		2,4-bis(N-ethylbenzamidido)-6-methoxy-s-triazine		2,4-bis(ethylamino)-6-trichloromethyl-s-triazine		2-ethoxy-4,6-bis(N-isopropylacetamidido)-s-triazine		2-isopropylamino-4-methylamino-6-methylmercaptos-triazine	
	4	8	4	8	4	8	4	8	4	8	4	8	4	8
Crops														
Alfalfa	33	53	37	77	100	100	Not Applied	37	63	90	23	50	100	100
B-ft. trefoil	43	63	37	67	100	100		37	57	90	57	77	100	100
Buckwheat	23	43	37	57	100	100		37	23	43	23	43	93	100
Castorbeans	23	53	23	53	100	100		23	33	53	23	37	90	100
Corn	10	20	4	17	77	77		27	17	27	27	57	50	87
Cotton	33	60	77	70	73	90		77	43	90	77	80	67	90
Cowpeas	33	60	23	57	80	93		33	30	50	33	57	63	90
Cucumber	43	60	33	53	73	100		33	53	83	33	53	100	100
Flax	23	43	33	53	100	93		57	23	53	30	57	100	100
Gladiolus	0	5	1	1	12	29		9	0	37	0	0	9	9
Lespedeza	67	87	37	77	100	100		77	73	90	77	93	100	100
Lima beans	23	43	23	43	33	70		50	23	43	27	47	33	67
Oats	23	43	23	43	73	93		17	23	43	23	43	77	93
Peanuts	23	43	37	43	57	90		43	27	43	25	45	43	87
Red clover	43	63	37	67	100	100		37	57	90	57	77	100	100
Safflower	23	50	23	50	100	100		43	23	50	33	53	100	100
Snapbeans	23	57	30	50	77	100		50	37	57	33	70	100	100
Sorghum	37	60	20	30	80	100		23	27	53	23	43	90	100
Soybeans	27	47	33	53	57	77		23	33	53	27	43	33	67
Squash	23	53	23	50	100	100		20	20	53	30	53	93	100
Sudan grass	30	67	30	30	100	100		40	27	53	23	43	100	100
Sugar beets	23	57	17	47	100	100		91	47	67	93	100	100	100
Walnuts	33	53	1	1	47	67		---	27	47	73	90	20	29
White clover	67	87	37	57	100	100		37	90	91	90	93	100	100
Crop Tox. Av.	30	53	24	46	79	90		42	37	60	39	59	78	88
Weeds														
Crabgrass	---	---	---	---	---	---		---	---	---	---	---	---	---
Ryegrass	23	40	23	43	93	100		57	23	70	43	63	93	100
Other grasses	23	40	23	43	93	100		70	23	70	100	100	100	100
Lambquarters	23	43	33	50	100	100		77	80	93	43	100	100	100
Mustard	23	43	30	50	93	100		77	80	93	100	100	100	100
Pigweed	23	43	33	50	100	100		77	80	93	100	100	100	100
Other broadleaf	23	43	33	50	90	93		67	80	90	70	93	93	93
Weed Tox. Av.	23	42	23	48	97	100		71	61	85	67	85	97	98
Total Tox. Av.	29	51	24	47	82	92		48	41	65	45	64	81	90

* / Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 22. The effect of several chemicals as pre-emergence treatments on several crops and weeds.

Crops	Chemical	2,4-bis(isopropylamino)-6-methylmercaptos-triazine		2-methoxy-4,6-bis(isopropylamino)-6-triazine		2-methoxy-4,6-bis(ethylamino)-9-triazine [simetone]		2-methoxy-4,6-bis(3-methoxypropylamino)-9-triazine									
		Rate lb/A	%	4	8	4	8	4	8	4	8	4	8	4	8	4	8
Alfalfa			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
B-ft. trefoil			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Buckwheat			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Castorbeans			77	100	90	100	100	100	100	100	100	100	100	100	100	100	100
Corn			23	57	13	33	37	17	33	17	33	17	33	17	33	17	33
Cotton			37	57	47	77	77	47	77	47	77	47	77	47	77	47	77
Cowpeas			57	77	37	57	57	37	57	37	57	37	57	37	57	37	57
Cucumber			90	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Flax			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Gladiolus			5	10	9	14	9	9	17	9	17	9	17	9	17	9	17
Lespedeza			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Lima beans			30	50	30	50	27	27	47	20	33	20	33	20	33	20	33
Oats			77	100	90	95	90	90	90	20	33	20	33	20	33	20	33
Peanuts			27	47	23	53	20	20	33	20	33	20	33	20	33	20	33
Red clover			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Safflower			93	100	83	90	47	57	63	13	23	13	23	13	23	13	23
Snapbeans			100	100	93	100	57	77	77	23	43	23	43	23	43	23	43
Sorghum			63	100	37	53	27	33	40	23	33	23	33	23	33	23	33
Soybeans			23	57	33	53	27	40	100	23	33	23	33	23	33	23	33
Squash			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Sudan grass			100	100	67	93	43	73	73	47	67	47	67	47	67	47	67
Sugar beets			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Walnuts			20	37	20	40	30	50	50	23	43	23	43	23	43	23	43
White clover			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Crop Tox. Av.		72	83	70	80	62	74	49	64								
Weeds																	
Crabgrass			---	80	93	93	93	90	93	---	---	---	---	---	---	---	---
Ryegrass			93	93	93	93	93	90	93	93	93	90	93	93	93	90	93
Other grasses			93	93	90	100	100	100	100	100	100	100	100	100	100	100	100
Lambquarters			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mustard			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Pigweed			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Other broadleaf			93	100	90	93	93	93	93	93	93	93	93	93	93	93	93
Weed Tox. Av.		97	98	93	97	97	97	94	95								
Total Tox. Av.		77	86	74	83	69	79	58	70								

% Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 23. The effect of several chemicals as post-emergence treatments on several crops and weeds.

Chemical		1	1	4	20	8	8	8	8	8	8	8	8	8	8	8	4	4	4
		alkanoilamine salt [2,4-D]	2-(2,4,5-trichlorophenoxy)propionic acid, alkanoilamine salt [Silvex]	4,6-dinitro-2-sec butylphenol, alkanoilamine salt [DNBP]	0-2,4-dichlorophenyl 0-methyl isopropylphosphoramidate	3,4-dichloropropionanilide	ethyl 0-nitrophenylsulfide	2,3,5,6-tetrachloroterephthalic acid, dimethyl ester	isopropyl N-(3-chlorophenyl)-carbamate [CIPC]	4-chloro-2-butyl N-(3-chlorophenyl)carbamate [barbane]	ethyl N,N-di-n-propylthiolcarbamate [EPTC]	ethyl ethyl-n-butylthiolcarbamate	n-propyl-di-n-propylthiolcarbamate	propyl ethyl-n-butylthiolcarbamate	N-(3,4-dichlorophenyl)methylacrylamide	N-(3,4-dichlorophenyl)-2-methylpentanamide	N-(3-chloro-4-methylphenyl)-2-methylpentanamide	3-(3,4-dichlorophenyl)-1,1-di-methylurea [duron]	1-chloro-N-(3,4-dichlorophenyl)-N,N-dimethylformamide (applied in 6.6 gal/A fuel oil)
Crops	Rate lb/A	93	67	80	47	90	47	10	47	67	23	37	47	53	50	100	90	100	100
Alfalfa		93	47	67	80	100	43	0	53	67	40	23	53	47	100	100	100	100	100
B-ft. trefoil		93	53	93	93	100	37	40	93	100	60	23	53	47	100	100	100	100	100
Buckwheat		93	100	100	100	100	100	0	100	93	37	10	23	43	93	100	100	100	100
Castorbeans		0	14	5	47	57	43	20	29	67	24	33	37	37	77	67	67	100	43
Corn		100	100	93	77	100	100	43	57	90	77	90	90	77	93	100	100	100	100
Cotton		100	90	53	93	100	60	39	47	80	43	24	20	19	77	100	90	100	100
Cowpeas		100	100	100	100	100	67	63	100	100	90	90	93	93	93	100	100	100	100
Cucumber		83	100	100	93	100	57	17	100	100	47	47	27	30	93	100	100	100	100
Flax		93	100	100	93	100	5	9	10	14	0	0	0	19	22	39	19	80	70
Gladiolus		9	14	19	9	45	47	53	90	63	90	57	67	80	100	100	93	100	100
Lespedeza		93	100	90	90	100	47	10	67	63	23	14	17	27	90	100	100	100	100
Lima beans		100	100	43	100	100	27	37	100	100	43	27	37	47	43	60	50	93	43
Oats		0	14	14	100	100	47	37	100	100	33	14	39	14	57	100	67	100	100
Peanuts		0	0	17	14	100	14	0	47	67	19	14	39	14	57	100	67	100	100
Red clover		93	47	57	63	100	43	0	60	67	43	43	47	35	80	67	53	100	100
Safflower		100	100	100	63	100	67	53	50	27	23	23	33	33	93	100	100	100	100
Snapbeans		100	90	90	93	100	53	27	67	77	40	17	20	43	90	100	100	100	100
Sorghum		0	29	0	47	54	33	17	57	63	73	63	67	70	53	67	57	93	67
Soybeans		100	100	93	27	100	10	27	57	47	55	43	27	43	90	100	93	100	100
Squash		75	55	100	100	100	90	37	93	90	47	27	30	63	100	100	100	100	100
Sudan grass		0	29	0	40	60	53	17	57	67	57	57	57	57	50	67	50	93	23
Sugar beets		93	63	93	93	100	33	27	47	30	47	17	57	57	93	100	100	100	100
Sugar beets		14	14	27	100	59	19	9	19	100	14	0	93	9	29	100	90	60	43
Walnuts		14	14	27	100	59	19	9	19	100	14	0	93	9	29	100	90	60	43
White clover		93	90	67	53	100	43	10	53	67	47	43	47	57	100	100	100	100	100
Crop Tox. Av.		67	63	63	72	88	47	24	63	71	45	35	45	47	78	90	83	97	86
Weeds																			
Crabgrass		20	33	50	93	83	10	0	80	93	67	43	70	53	93	93	93	100	100
Ryegrass		27	27	57	53	77	10	0	92	93	67	57	70	53	80	90	63	100	100
Other grasses		30	30	67	80	93	10	0	80	73	70	53	63	53	93	93	93	100	93
Lambquarters		100	93	93	90	100	20	27	57	73	57	40	63	67	100	100	100	100	100
Mustard		100	100	100	90	100	83	14	53	77	40	43	47	67	73	100	100	100	100
Pigweed		100	93	93	90	100	20	30	57	93	57	40	63	67	93	100	100	100	100
Other broadleaf		93	93	93	90	93	20	37	80	93	50	40	63	53	93	93	93	93	93
Weed Tox. Av.		67	67	79	84	92	25	15	71	88	58	45	64	59	88	96	92	99	99
Total Tox. Av.		67	64	66	74	89	42	22	65	75	48	37	49	50	80	92	85	97	89

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 24. The effect of several chemicals as post-emergence treatments on several crops and weeds.

Chemical	Fuel oil (6.6 gal/A)	5-(3,4-dichlorophenyl)-1-iso-propyl-1-(2-propenyl) urea	2,3,6-trichlorobenzoic acid, sodium salt [2,3,6-TBA]	2-methyl-3,6-dichlorobenzoic acid, dimethylamine salt	2-methoxy-3,6-dichlorobenzoic acid, monoethanolamine salt	2-methoxy-3,6-dichlorobenzoic acid, triethylamine salt	2-methoxy-3,6-dichlorobenzoic acid, dimethylamine salt	2-methoxy-3-chloro-6-methyl-benzoic acid	2-methoxy-3-methyl-5-chloro-benzoic acid	2-methoxy-3-nitro-5-chloro-benzoic acid	2,5-dichloro-3-bromobenzoic acid	2-methoxy-3,5-dichlorobenzoic acid, monoethanolamine salt	2-methoxy-3,5-dichlorobenzoic acid, dimethylamine salt	2-methoxy-3,5-dibromobenzoic acid	2-methoxy-3,5-dinitrobenzoic acid
Crops	Rate lb/A	4	2	2	2	2	2	2	2	2	2	2	2	2	2
Alfalfa	14	90	100	100	100	100	100	100	100	100	100	100	100	100	100
B-ft. trefoil	43	93	100	100	100	100	100	100	100	100	100	100	100	100	100
Buckwheat	38	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Castorbeans	100	93	100	100	100	100	100	100	100	100	100	100	100	100	100
Corn	10	43	80	40	23	77	73	63	70	100	100	100	100	100	100
Cotton	30	93	100	100	100	100	100	100	100	100	100	100	100	100	100
Cowpeas	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Cucumber	43	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Flax	10	100	93	90	100	93	100	100	100	100	100	100	100	100	100
Gladiolus	27	19	20	20	19	29	14	24	24	9	0	0	0	0	0
Leopedeza	90	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Lima beans	17	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Oats	10	33	30	40	14	43	33	100	40	0	0	0	0	0	0
Peanuts	10	57	90	100	93	90	90	93	43	0	0	0	0	0	0
Red clover	43	90	100	100	100	100	100	100	100	100	100	100	100	100	100
Safflower	73	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Snapbeans	17	27	50	40	10	43	43	53	50	19	19	17	17	17	17
Sorghum	33	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Soybeans	60	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Squash	17	27	50	50	10	43	23	53	50	19	19	17	17	17	17
Sudan grass	27	100	93	100	100	100	100	100	100	100	100	100	100	100	100
Sugar beets	9	19	28	100	90	100	100	100	100	69	9	50	47	40	40
Walnuts	100	93	100	100	100	100	100	100	100	93	93	93	93	93	93
White clover	100	93	100	100	100	100	100	100	100	93	93	93	93	93	93
Crop Tox. Av.	40	77	80	87	82	88	87	91	89	80	50	19	40	66	68
Weeds															
Crabgrass	10	23	0	0	0	0	17	0	0	14	14	20	0	0	0
Ryegrass	0	60	9	0	0	0	17	0	0	14	14	20	0	0	0
Other grasses	0	60	80	60	0	37	17	30	20	30	30	20	23	43	43
Leavesquarters	53	90	93	93	100	100	100	100	100	93	93	54	90	67	67
Mustard	10	100	90	93	100	93	90	93	93	93	93	20	27	23	20
Pigweed	53	90	93	93	100	100	100	100	100	93	93	54	90	67	67
Other broadleaf	53	90	93	93	100	100	100	100	100	93	93	57	67	43	43
Weed Tox. Av.	26	73	65	62	57	61	63	60	59	61	61	35	43	28	30
Total Tox. Av.	37	77	77	81	76	82	82	84	82	76	46	18	36	55	38

* / Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 25. The effect of several chemicals as post-emergence treatments on several crops and weeds.

Crop	Rate lb/A	Chemical	3-amino-2,5-dichlorobenzoic acid, triethylamine salt [lamiben]															
			2	4	2	2	2	2	2	2	2	2	2	2	2	2	2	4
Crops																		
Alfalfa	30	50	100	100	100	93	27	50	93	33	90	67	17	93	10	14	30	90
B-ft. trefoil	80	80	100	100	100	93	53	93	93	33	100	67	43	93	14	23	50	93
Buckwheat	50	80	100	93	100	100	53	60	100	63	90	73	7	93	23	33	30	90
Castorbeans	50	80	100	100	100	93	33	40	100	33	100	100	0	100	33	33	30	0
Corn	15	27	50	24	100	57	0	0	100	33	15	17	23	17	24	43	25	0
Cotton	50	90	100	100	100	100	20	93	100	60	93	100	43	100	33	67	100	93
Cowpeas	40	70	100	100	100	100	53	90	100	43	93	100	23	100	33	53	100	100
Cucumber	40	80	100	100	100	100	63	90	100	63	93	100	100	100	100	100	93	100
Flax	40	50	80	77	100	73	23	40	73	14	100	90	30	100	53	77	40	50
Gladiolus	5	15	30	29	100	19	0	0	93	9	20	14	0	29	17	19	0	15
Leopedeza	30	50	100	100	100	33	60	60	100	53	100	67	73	93	14	23	50	93
Lima beans	60	80	93	100	100	23	60	60	100	53	93	80	23	93	23	63	70	80
Oats	40	60	40	53	100	0	0	0	100	53	20	17	0	17	0	33	0	93
Peanuts	10	15	93	100	100	70	0	0	57	37	60	70	27	77	24	47	35	35
Red clover	80	100	100	100	100	100	53	93	93	57	100	67	17	93	14	23	50	93
Safflower	50	80	100	100	100	77	93	93	100	73	100	93	43	80	53	90	93	100
Snapbeans	40	70	93	90	100	23	60	60	92	54	93	93	53	93	23	62	77	80
Sorghum	50	60	40	43	100	0	0	0	14	33	50	23	0	33	27	33	37	0
Soybeans	30	50	100	93	100	23	93	93	100	43	93	100	43	100	29	63	50	93
Squash	40	60	100	100	100	93	73	70	90	83	90	67	43	93	33	57	90	100
Sudan grass	50	80	40	43	100	19	0	0	19	33	40	23	0	10	27	33	37	0
Sugar beets	50	90	100	100	100	80	50	50	80	80	93	77	27	77	23	57	90	100
Walnuts	15	90	93	100	100	20	14	40	62	19	93	77	0	19	19	50	13	10
White clover	30	50	100	100	100	53	53	90	93	43	100	67	17	93	12	23	50	93
Crop Tot. Av.	41	64	85	85	74	31	53	77	46	68	28	75	27	45	64	81		
Weeds																		
Crabgrass	20	40	0	0	20	27	20	23	0	27	0	27	0	25	0	14	0	63
Ryegrass	20	40	0	0	0	27	15	23	17	27	0	27	0	33	14	14	15	93
Other grasses	40	60	20	30	30	30	20	30	27	70	40	27	10	40	30	40	40	80
Lambequarters	60	80	93	100	93	93	93	93	60	93	90	90	17	90	23	90	90	90
Mustard	20	40	80	93	93	23	40	93	53	80	80	43	0	100	20	33	30	93
Pigweed	60	80	93	100	93	77	93	93	60	93	93	90	17	90	23	60	70	90
Other broadleaf	50	70	93	93	93	63	90	93	57	93	93	90	20	90	20	73	90	90
Weed Tot. Av.	39	59	54	59	60	40	53	64	39	56	9	67	19	46	31	56		86
Total Tot. Av.	40	63	78	82	71	33	53	74	44	66	23	73	25	46	43	62		82

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 26. The effect of several chemicals as post-emergence treatments on several crops and weeds.

	Chemical	Rate lb/A	2-chloro-4,6-bis(ethylamino)-s-triazine (sulfazine 80% WP)	2-allylamino-4-chloro-6-isopropylamino-s-triazine	2-chloro-4-ethylamino-6-dethylamino-s-triazine [trietazine]	2-chloro-4-ethylamino-6-(3-methoxypropylamino)-s-triazine	2-chloro-4-isopropylamino-6-(3-methoxypropylamino)-s-triazine	2-diethylamino-4-N-isopropylacetamido-6-methoxy-s-triazine	2-N-ethylacetamido-4-N-isopropylacetamido-6-methoxy-s-triazine	2,4-bis(N-ethylacetamido)-6-methoxy-s-triazine	2-ethylamino-4,6-bis(isopropylamino)-s-triazine	2,4-bis(ethylamino)-6-isopropylamino-s-triazine	2-ethylamino-4-isopropylamino-6-methylmercapto-s-triazine	2,4-bis(ethylamino)-6-methylmercapto-s-triazine	2,4-bis(N-ethylbenzamido)-6-methoxy-s-triazine	2,4-bis(ethylamino)-6-trichloromethyl-s-triazine	2-ethoxy-4,6-bis(N-isopropylacetamido)-s-triazine	2-isopropylamino-4-methylmercapto-s-triazine	2,4-bis(isopropylamino)-6-methylmercapto-s-triazine
Crops			%																
Alfalfa			47	17	93	93	100	14	40	67	18	14	37	100	93	27	40	100	100
B-ft. trefoil			63	63	93	90	100	37	40	27	17	0	77	100	40	70	30	100	100
Buckwheat			100	100	100	100	100	53	83	80	23	53	53	100	100	67	100	100	100
Castorbeans			100	100	100	100	100	90	100	100	40	5	100	100	100	90	100	100	100
Corn			17	9	0	0	0	19	57	33	0	7	33	77	47	23	47	50	93
Cotton			93	57	93	100	100	27	53	63	30	37	43	100	70	37	80	100	100
Cowpeas			93	90	100	93	100	57	57	100	50	63	77	100	100	100	20	100	100
Cucumber			100	100	100	100	100	90	67	77	70	100	100	100	93	100	55	100	100
Flax			90	33	93	12	15	30	47	47	23	27	47	100	40	47	23	100	100
Gladiolus			5	9	14	5	15	19	19	19	0	29	44	39	20	9	15	32	59
Leopederia			90	77	90	100	100	37	57	67	30	37	100	100	90	100	40	100	100
Lima beans			33	100	100	93	100	35	33	90	20	33	45	100	70	15	70	100	100
Oats			90	33	90	90	93	14	27	33	0	14	67	100	27	30	10	93	93
Peanuts			90	27	60	10	20	14	47	19	0	0	14	100	23	15	27	100	93
Red clover			90	57	93	93	100	33	40	27	17	43	77	100	40	20	30	100	93
Safflower			93	93	100	90	100	93	93	93	20	33	100	100	90	90	100	100	100
Snapbeans			100	23	100	90	100	23	40	37	23	33	80	100	23	23	70	100	100
Sorghum			0	27	0	40	15	19	57	37	25	14	19	93	93	15	57	69	93
Soybeans			100	33	93	100	100	14	53	27	10	43	63	100	50	23	20	100	100
Squash			100	100	100	100	100	53	70	100	27	90	100	100	35	100	23	100	100
Sudan grass			0	14	0	40	5	19	30	27	15	14	19	93	20	15	63	77	93
Sugar beets			93	93	100	90	100	33	57	93	30	57	57	100	50	50	80	100	100
Walnuts			9	9	15	5	100	14	100	14	90	0	47	40	25	10	0	100	100
White clover			90	67	93	90	100	37	47	57	30	10	67	100	40	60	30	100	100
Crop Tox. Av.			71	52	76	72	78	36	55	55	25	31	56	94	48	49	45	93	93
Weeds																			
Crabgrasses			77	20	43	93	93	27	27	57	0	10	27	100	10	30	40	100	100
Rye-grass			90	20	93	70	93	27	17	30	0	10	17	77	10	23	20	93	90
Other grasses			90	20	53	93	93	20	30	63	0	10	27	100	20	74	20	100	100
Lambquarters			93	93	93	100	100	53	93	93	80	93	80	100	90	100	80	100	100
Mustard			100	57	93	93	100	53	37	80	50	90	93	100	0	50	40	100	90
Pigweed			93	77	93	93	100	53	67	67	80	80	80	100	70	60	53	100	100
Other broadleaf			90	90	93	93	100	53	53	80	80	90	80	100	40	50	60	100	100
Weed Tox. Av.			90	54	80	91	97	41	46	67	41	55	58	97	34	44	44	98	97
Total Tox. Av.			75	52	77	76	82	37	53	58	29	36	57	95	45	48	45	94	94

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 28. A brief generalized summary of preliminary soil-incorporated pre-planting data by crop and chemical group for easy reference for selection of chemicals for specific crops. ^{1/}

Chemical	Substituted benzoic acids (Tables 5-9)	Substituted phenylacetic acids and derivatives (Tables 9-10)	s-triazines (Tables 10-15)	carbamates (Tables 3-4)	Substituted phenylurea derivatives (Table 5)	3,4-dichloropropionanilide (Table 6)	ethyl-o-nitrophenylsulfide (Table 2)	2,3,5,6-tetrachlorotereph- thalic acid, dimethyl ester (Table 2)
<u>Crops</u>								
Cabbage						x		x
Corn	x	x	x	x	x	x	x	x
Cotton			x	x	x	x		x
Cucumber						x	x	x
Peanuts			x	x		x	x	x
Soybeans			x	x	x	x		x
<u>Weeds</u>								
Grasses	x	x	x	x	x	x	x	x
Broadleaf	x	x	x	x	x	x	x	

^{1/} Checks are placed opposite crops that tolerated one or more of the respective chemicals at an active rate of application at one or more of the pre-planting treatment dates.

Table 29. A brief generalized summary of preliminary pre-emergence data by crop and chemical group for easy reference for selection of chemicals for specific crops. ^{1/}

Chemical	Substituted benzoic acids (Tables 18-19)	Substituted phenylacetic acids and derivatives (Tables 19-20)	s-triazines (Tables 20-22)	carbamates (Tables 16-17)	Substituted N-phenylamides (Table 17)	Substituted phenylurea derivatives (Tables 17-18)	O-2,4-dichlorophenyl O-methyl isopropylphosphoramido- thioate (Table 16)	3,4-dichloropropionanilide (Table 16)	ethyl-o-nitrophenylsulfide (Table 16)	2,3,5,6-tetrachlorotereph- thalic acid, dimethyl ester (Table 16)
<u>Crops</u>										
Alfalfa					x		x			
B-ft trefoil					x		x			
Buckwheat			x							
Castorbeans	x		x	x		x	x		x	x
Corn	x	x		x	x	x	x		x	x
Cotton			x		x					
Cowpeas			x			x	x		x	x
Cucumber			x		x					
Flax			x		x					
Gladiolus	x	x		x	x	x	x	x	x	x
Lespedeza										
Lima beans	x			x	x	x	x			x
Oats			x	x	x	x	x		x	x
Peanuts			x	x	x	x	x		x	x
Red clover					x		x			
Safflower			x	x			x			x
Snapbeans	x			x	x					x
Sorghum			x		x		x			
Soybeans	x		x		x	x	x			x
Squash	x		x				x			
Sudan grass			x							
Sugar beets				x						
Walnuts		x		x		x	x	x		
White clover										
<u>Weeds</u>										
Grasses	x	x	x	x	x	x	x	x	x	
Broadleaf	x	x	x	x	x	x	x	x	x	x

^{1/} Checks are placed opposite crops that tolerated the respective chemicals at active pre-emergence rates of application.

Table 30. A brief generalized summary of preliminary post-emergence data by crop and chemical group for easy reference for selection of chemicals for specific crops. ^{1/}

Chemical	Substituted benzoic acids (Tables 24-25)	Substituted phenylacetic acids and derivatives (Table 25)	s-triazines (Tables 25-27)	carbamates (Table 23)	Substituted N-phenylamides (Table 23)	Substituted phenylurea derivatives (Tables 23-24)	O-2,4-dichlorophenyl O-methyl isopropylphosphoramido- thioate (Table 23)	
<u>Crops</u>								
Alfalfa		x	x					
B-ft trefoil		x	x					
Buckwheat			x					
Castorbeans		x						
Corn	x	x	x	x				
Cotton			x					
Cowpeas		x	x					
Cucumber								
Flax			x					
Gladiolus	x	x	x	x	x	x	x	
Lespedeza		x	x					
Lima beans			x					
Oats	x	x	x					
Peanuts	x		x	x			x	
Red clover		x	x					
Safflower			x	x				
Snapbeans			x					
Sorghum	x	x	x			x		
Soybeans			x				x	
Squash			x					
Sudan grass	x	x	x			x		
Sugar beets				x				
Walnuts	x	x	x	x	x	x		
White clover		x	x					
<u>Weeds</u>								
Grasses			x	x	x	x	x	
Broadleaf	x	x	x	x	x	x	x	

^{1/} Checks are placed opposite crops that tolerated the respective chemicals at active rates of post-emergence application.

